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Victor Horsley Memorial Lecture

ON

THE RELATIONS OF SURGERY AND PHYSIOLOGY.

Delivered on October 25th, 1923,

BY

Sir EDWARD SHARPEY SCHAFER, F.R.S.,

Professor of Physiology in the University of Edinburgh.

I feel it a peculiar honour to have been asked to give the first Victor Horsley Memorial Lecture. I had the less hesitation in acceding to the request that I should do so because I am not only his oldest surviving scientific friend, but also his first fellow worker. It is nearly half a century ago that he made his appearance as an eager, intelligent student in the old Physiological Laboratory at University College. Sharpey had but recently retired from the teaching of physiology, although his personal influence was still felt. His place had been taken by Burdon-Sanderson, whose dominant idea was to make the work of the subject as experimental as possible; and anyone who has known Victor Horsley will readily understand with what keen interest this idea would inspire him. There can indeed be no doubt it was this training in experimental physiology which determined Horsley's future career, both as a physiologist and as a scientific surgeon. And it is this double career which may appropriately be chosen as an example of the mutually beneficial influence of surgery and physiology.

I had almost been tempted by our long and intimate friendship, which began so auspiciously at University College in 1875 and lasted until the day of his death in Mesopotamia in 1916, to dwell, on this the first opportunity of commemorating his career, upon the personal traits which were so striking a feature of Horsley's character—his enthusiasm, his love of truth and hatred of hypocrisy, his energetic striving for everything he judged to be right and inflexible antagonism to everything he thought wrong. But has not all that been done far better than I or anyone else could hope to do it, in the history which Mr. Stephen Paget has set forth in that inimitable style which characterizes all his writings? It is fortunate that the life of Victor Horsley was entrusted to such a biographer; nor was the biographer less fortunate in having such a subject! How splendidly he has taken advantage of his opportunity we all of us know.

I have chosen "The Relations of Surgery and Physiology" as the text upon which to base the remarks I have to make to-day. It is my object to show that these subjects are mutually dependent; that Physiology must call in the aid of Surgery to solve many of its most intricate problems, and that Surgery cannot make any real advance unless it proceeds hand in hand with Physiology.

It was not Horsley himself who established this principle, but he happened upon the time when it was beginning to be evident. Only a few years before, it might have been admitted that there was a certain amount of interdependence between Medicine and Physiology, but no one would have thought of connecting Surgery with anything but Anatomy. That experiments on animals were necessary in order to elucidate the functions of the body had indeed been conceded. It was recognized from Harvey onwards—yes, and even long before Harvey—that no true advance could be made in physiology without such experiments. The operations involved in them have somewhat unfortunately received the designation of "vivisection," and this title has caused many who are ignorant of their nature to regard them as of an entirely different character from surgical operations in the human subject—although they are conducted in exactly the same manner as in man, with the same precautions to prevent unnecessary pain, and with every effort to avoid unsatisfactory complications which might result from wound-infection and the like. But many of the older surgeons refused to believe that an operation on the lower animals could be utilized to obtain information which would be useful to them in the performance of similar operations in man, nor should I be surprised to hear that there are some who still hold this view. It is fortunate for the world that Victor Horsley was not one of these.

As I have remarked, he happened upon a time when the importance of animal experimentation as a guide to surgery was beginning to be recognized. There were two directions in which this tendency was particularly apparent. One of these involved the investigation of the functions of the brain: the other those of what we now term endocrine organs—the uses of which were then for the most part completely obscure. And it was just these two subjects which attracted the attention of the physiologically trained but hitherto unknown young surgeon whose work was to throw so much light upon these dark places of the organism; places which hardly anyone had hitherto ventured to approach. It is on this account that I propose to deal first with these particular aspects of the question of the relations of Surgery and Physiology. I will begin with the subject of the functions of the brain and its related subject, cranial surgery.

The Functions of the Brain and Cranial Surgery.

Not very long before the entry of Victor Horsley to University College as a medical student, a young Scotch physician named David Ferrier published an elaborate series of researches on the results of electric stimulation of the cerebral cortex in animals. Some of these were confirmatory of experiments performed on the dog and cat by Fritsch and Hitzig, although the method of stimulation employed by Ferrier was a vast improvement on that used by the German observers. But what rendered Ferrier's results really important was the fact that he extended these researches to the brains of monkeys, which are entirely different in the conformation of the cerebral cortex from the brains of the dog and cat, but present a remarkable resemblance to the brain of the highest member of the order Primates, man. It is scarcely necessary to say that the brilliant experiments of Ferrier aroused universal interest. I shall myself never forget the impression made upon me by one such experiment which Ferrier showed to Burdon-Sanderson and the rest of us who were working in his laboratory. The confident way in which he could predict what would be the movement resulting from touching this or that portion of the cortex with the electrodes was calculated to arouse our wonder and admiration; and the demonstration always provokes the same feelings in every audience of students when the experiment is repeated before them. It was these experiments—supplemented as they have since been by those of Horsley and Beevor on the brain of the orang, and by the yet more recent and accurate results obtained by Sherrington and Grünbaum upon the chimpanzee and gorilla—which have enabled the surgeon to locate the seat of an injury and tumour in the human brain, and to remove the tumour or to deal with the source of injury with advantage to the patient.

In all researches in experimental physiology, there are two chief methods employed to elucidate the functions of an organ. One is the artificial stimulation of the organ, causing it to pass into a condition of activity, the effect of such activity being duly noted. The other is the production of an injury in the organ, or its complete removal, the effect, if any, which results from such injury or removal being observed. With regard to the functions of the brain, this last aspect of the subject had by no means been neglected by antecedent workers, but discrepant results had been obtained. Indeed, up to the time of which I am speaking—that is, the epoch of Fritsch and Hitzig, and of Ferrier—physiologists were disposed to agree with Flourens that the whole cortex acted as one undivided organ and that the several parts of the body are not individually represented in it; in other words, that there is no such thing as localization of functions in the cerebrum. One acute clinical observer, Hughlings Jackson, had, it is true, pointed out that the phenomena of traumatic epilepsy seem undoubtedly to indicate the existence of some kind of localization in the cortex; since the "march" of the movements which result from the excitation producing the epileptic fit is different according to the seat of injury.

But such a complete localization as we now know to exist was unsuspected, and it was largely on this account that so much interest was aroused by the excitation experiments of Ferrier.

But if excitation of a particular area of the cerebral cortex provokes certain movements, it does not follow that we are to regard that area as representing a nerve centre for governing or producing those movements unless removal of the area is followed by paralysis of the movements. We may leave out of present consideration whether the so-called centre is automatic—that is, works spontaneously—or whether it only represents the point of arrival of sensory impulses and the point of departure of the corresponding impulses to motor centres in the lower part of the central nervous system—that is, whether it is a reflex centre. For this question, which was warmly debated at one time, may now be considered to be definitely settled in favour of the second hypothesis. In either case the final result of excitation and of ablation will be in the first case production of definite movements, in the second the inability to perform them.

At the period I am speaking of, many of the facts had been established, but the explanation was a matter of controversy. There were, moreover, still certain parts of the hemisphere which Ferrier had not explored, or which in his hands had yielded negative replies. And the results of the extirpations which he had performed in conjunction with his colleague Gerald Yeo, then professor of physiology in King's College, were not altogether satisfactory, nor did they agree in certain particulars with the work of others, especially that of Herman Munk of Berlin, who was working on much the same lines both in the dog and monkey.

This, then, was a problem still needing elucidation, and when in 1883 I succeeded Burdon-Sanderson in the Chair of Physiology at University College it was one of the first investigations at which I resolved to work, especially with the view of determining more exactly the results of removal of definite areas of the cortex. Now Ferrier and Yeo's work—I am referring only to their earlier work, the later was accomplished under different conditions—had been done by pre-Listerian methods, and I felt convinced that this might be the source of some of the discrepancies exhibited, as compared with the results of Munk and others. My own surgical training was unfortunately also pre-Listerian owing to the slow progress which was made in London in the adoption of Lister's methods, and the active opposition with which they were met by many of the leading London surgeons. I therefore recognized the necessity of securing as a collaborator a young and skilful surgeon thoroughly imbued with Listerian ideas and enthusiastically interested in physiology. You may easily understand that I had no difficulty in making my selection, for Victor Horsley fulfilled all these conditions, and we were already on terms of personal intimacy. Gleefully did he accept the proposition that we should carry out this work together, and many were the hours which we devoted to it. In every case the first part of an experiment consisted in exploring by induction currents, after the manner of Ferrier, the particular area we desired to investigate, and the second part in removing the explored area, re-covering the brain and sewing up the wound. In these operations we made use of every Listerian practice, including to our woeful discomfort the recently introduced carbolic spray—a source of endless objurgations!

To these operations Horsley brought a remarkable amount of surgical skill. Our quadrumanous patients were kept under the best possible conditions, and in most cases made speedy recoveries. It is not saying too much if I add that Horsley obtained from these experiments a surgical experience of a unique kind. This experience he was presently—in his capacity of surgeon to the great hospital in Queen Square—to apply to the alleviation of human suffering in a domain which even the boldest surgeons had not ventured seriously to attack.

There is no better illustration of the mutual benefit which results when Surgery and Physiology go hand in hand than the history of our early efforts in this field of investigation. The benefit to Horsley I have pointed out. And for myself, I acknowledge with gratitude the debt I owe to my colleague for the opportunity I was afforded of learning the application of Listerian surgery to animal experimentation, a lesson the benefit of which I am more than ever conscious of after nearly forty years' experience, much as things have changed both in Physiology and in Surgery since that far-off, but never-to-be-forgotten time.

Our partnership was a fruitful one. We were able to extend Ferrier's observations in the monkey's brain to parts which he had not explored, although in this particular he had not left much for future investigation. But the young worker may take it from me who have grown old and experienced in scientific investigation, that if he wishes to discover new things he will do well to repeat with the aid of modern contrivances any experiment which has been long accepted as affording the last and most incontrovertible word on the subject. Almost certainly he will find some point which has been overlooked by the original investigator, and needless to say by those who have merely aimed at getting the same results. And almost certainly the exception will prove—that is, will test—the rule, and he may easily find that which has been looked upon from time immemorial as scientific gospel is badly in need of re-editing. In my experience nothing is so fertile in discovery as going carefully with one's eyes open, and with the aid of new methods, along a well worn track. I say with one's eyes open, for if one shuts them to everything that is not exactly what one expects to see many a discovery will be overlooked.

It is not my purpose to give an account of our work on the brain—work which, begun together, was eventually by force of circumstances carried on independently or in conjunction with other workers. One word, however, I would say about a trait in my colleague which, although in no way unfavourable to his character, rendered the actual conduct of our joint investigation somewhat laborious. He was too energetic. He would think nothing of performing several operations at a sitting, and acquired so much skill at them that they occupied a relatively small amount of time. But the operation was one thing, the study of the symptoms quite another. Now it takes a long time to make a thorough investigation of symptoms in the human subject—although in this case the subject himself can give much assistance. But when it comes to making the same kind of investigation in animals, and especially in monkeys, which are often wild, and the attention of which it is always difficult to fix, an unconscionable amount of time has to be devoted every day to each case. It so happened that just about this time Horsley was leading an extremely busy life. He was surgical registrar at University College Hospital—a position involving a huge amount of clerical work—and later assistant surgeon there; professor superintendent of the Brown Animal Sanatory Institution; assistant professor of pathology in University College; had a considerable if not very remunerative private practice; and, last but not least, was engaged to be married. The result of all this was that most of the observations on the operated animals had to be made by his colleague, and when there were several to be examined the amount of time that these occupied every day rendered the duty severe. All the clinical notes thus taken day by day had to be collated, and eventually boiled down—a process which involved many prolonged conjoint sessions. Upon the results of this collaboration I need not dwell. Are they not written in the chronicles of the Royal Society? And are they not decently buried in the *Philosophical Transactions*? May they rest there in peace!

The experience which Horsley had gained in these experiments—commenced in the laboratory at University College and continued at the Brown Institution—was invaluable to him in dealing with cranial surgery in man, and when the position of surgeon to the Hospital for Nervous Diseases in Queen Square fell vacant Horsley received the appointment. He lost no time in applying the knowledge he had acquired in the laboratory to the operating theatre in the hospital. Paget gives an interesting and humorous account of the first operation he performed there for a cranial tumour (p. 120). It was upon a Scotchman, was in every way successful, and was witnessed by a distinguished company, which included Hughlings Jackson and Ferrier. It was, of course, followed by many others, and these were often attended by eminent foreign surgeons, for Horsley's reputation as a cranial surgeon soon became widespread.

The facility with which he used either hand contributed not a little to the dexterity of his operations, and he never, in any circumstances, lost the sang-froid which is essential to the surgeon.

THE FUNCTIONS OF THE THYROID GLAND.

Although by the work which Horsley had done upon the brains of monkeys and apes he had become one of the most skilful and scientific operators upon that part of human anatomy, he was much too all-round a man to confine himself to a single object, and we must next follow his career in another subject—that, namely, dealing with the functions of the thyroid gland, to which he brought equally keen enthusiasm for physiological investigation and skill in surgical procedure. Like that upon the functions of the brain, this also has an interesting preliminary history.

The year before Victor Horsley was born, Moritz Schiff of Geneva, one of the most active physiologists of the middle of the last century, had published the results of observations he had made upon animals, the thyroids of which he had extirpated. But at that time neither physiologists nor medical men were prepared to take much interest in the thyroid, nor indeed in any of the so-called ductless glands, which now under another name occupy so prominent position both in physiology and in clinical medicine. Schiff's work, therefore, which was not without interest and importance, passed unnoticed, and the matter was allowed to rest for many years. But just about the time that Horsley was starting his surgical career, the subject of the thyroid and its functions had come into prominence on account of the fact that it was becoming the practice amongst surgeons in Switzerland—in which country tumours of the thyroid are common—to remove such tumours entirely when they were inconveniently large. In such cases of complete removal very serious symptoms resulted—symptoms which closely resembled those which had been described some ten years previously by Sir William Gull as a cretinoid condition of adult life, and were later shown by Ord to be associated with absence or atrophy of the thyroid: Ord applied the term "myxoedema" to the syndrome. The symptoms resulting from thyroid removal were recognized by the Swiss surgeons J. and A. Reverdin as resembling those of myxoedema, and they gave to them the name *operative myxoedema*. Th. Kocher, who described them at about the same time, spoke of the syndrome as *cachexia strumipriva* or *thyreopriva*, the name by which it is now generally known, although the term "operative myxoedema" best describes its cause and symptoms. These observations of the Swiss surgeons were published in 1883, and led immediately to a great revival of interest in the thyroid both amongst physicians and clinicians. Schiff himself repeated and extended his old experiments, and many other physiologists took up the subject, interest in which is indeed by no means exhausted even at the present day.

How Victor Horsley came to start experiments upon the thyroid is narrated by Paget:

> "On November 23rd, 1883, at a meeting of the Clinical Society of London, there was a discussion over a case of myxoedema shown by Dr. Drewitt; and Felix Semon called attention to Kocher's observations and said positively that cretinism, myxoedema, and cachexia strumipriva were closely allied conditions, having in common either absence or more probably complete degeneration of the thyroid gland: and that they could hardly be attributed to any other cause. On December 14th the Clinical Society appointed a Committee to investigate the whole subject. Ord was Chairman, Hadden was Honorary Secretary, and Horsley was a member of the Committee.
>
> "It was of necessity that the investigation should include an experimental study of the healthy gland in healthy animals . . . and recognizing 'the hitherto undreamt of importance of the thyroid gland,' they asked Horsley to study it by the experimental method. They needed a physiologist and a surgeon, and they had them in him."

Horsley started this investigation in my laboratory at University College, working at first with Rickman Godlee, who was also a member of the Committee. They made several experiments together upon monkeys: we had a room specially prepared and warmed for keeping those animals. But very soon the work was transferred to the Wandsworth Road, Horsley being now professor superintendent of the Brown Institution there, and he found it inconvenient to carry on work in both places. So he continued the investigation alone, and dealt with the results in the lectures which he was expected to give annually at the University of London, the first of these being published in the *British Medical Journal* in January, 1885, and the next in the *Lancet* in 1886. It is somewhat singular that, with the exception of two short notes communicated to the Royal Society, he never took the trouble to send the results of these experiments upon the thyroid to any scientific periodical, although they were mentioned in his annual reports to the Committee of the Brown Institution, and ultimately appeared in the report of the Committee on Myxoedema, published in 1888.

The reason for this silence on the part of an investigator like Horsley, who never in any other subject had the least hesitation in giving his results to the world whenever they were sufficiently definite, was, I imagine, a certain indefiniteness and variability in the effects obtained from the removal of the gland. For some animals were simply rendered apathetic, with slow movements, a low body temperature, and a general deficiency in vitality; others showed acute nervous symptoms, with muscular tremors, which might pass into fits of greater or less violence, and terminate in death. Horsley himself seems to have thought that these were stages of the same condition. But we now know that the two kinds of symptoms were due to entirely different causes, as in the one case the thyroid alone had been removed, and in the other the removal had included the parathyroids. Unfortunately, at the date of these experiments, the parathyroids, although they had been seen and described some years earlier, had not been recognized as organs having an entirely different function from the thyroid. It was only some years later (1891) that Ernest Gley, the eminent professor of physiology in the Collège de France, discovered this function, and showed that the symptoms of nerve excitation are entirely due to the removal of the parathyroids, and are not seen when these, or some of them, are left intact in removing the thyroid. On the other hand, removal of the thyroid alone without the parathyroids produces all the symptoms of cretinism and cachexia strumipriva.

The fact that when dealing with young animals the parathyroids (unless looked for, and they were at that time unknown) are more likely to be removed along with the thyroid (as age advances, some of them move further away from the thyroid) accounts for the circumstance that Horsley found most of his young animals died in a few days with violent nervous symptoms. In consequence of this he missed the very important point that the thyroid exerts a remarkable influence on growth and nutrition, including the nutrition of nerve cells; which is indeed now established as one of its principal functions. But we cannot blame him for missing this point, since our knowledge of the thyro-parathyroid apparatus was not sufficiently advanced at the time.

THE PITUITARY BODY.

There is another important endocrine organ to which Horsley devoted a good deal of attention—namely, the pituitary body. He was, I believe, the first to endeavour to determine the effect of removal of this organ, for about 1886 he made one or two attempts to reach and destroy it through the pharynx and base of the skull. The conclusion he arrived at was that it is an organ which is not essential to life. Many years later he repeated these experiments and apparently saw no reason to alter his opinion, although in the meantime a number of other investigators who adopted other means of reaching the gland had come to an opposite conclusion. There is now no doubt that in most adult animals at least the loss of the pituitary body or even of its anterior lobe alone is incompatible with life, and had Horsley proceeded to attack the gland by the same (lateral) route as has been employed by most other investigators, a route in which every step of the operation is visible, and perfect asepsis can be ensured, he would, I am sure, have obtained the same results. His original method offers many difficulties from the liability to haemorrhage and sepsis, and from the impossibility of seeing what one is removing when working at the bottom of a deep and narrow hole.

Horsley was inclined to regard the results obtained by

those who operated by the lateral method as due to interference with the brain, but this could not be so, for exactly the same operation can be performed for exposure of the pituitary, but if it is left untouched no adverse symptoms follow. Moreover, one of my assistants, Mr. Norman Dott, himself a skilful surgeon, has recently devised a method of destroying the gland completely in the cat, by a process of electrolysis, without any exposure or any injury to the brain. The sella turcica is reached by passing a fine trochar conveying a carefully guarded needle along the outer margin of the orbit, and through the sphenoidal fissure. This needle conveys the necessary current and the whole operation occupies only a minute or two. By careful adjustment of the position of the electrolysis needle it is possible to destroy either the anterior or posterior portion of the pituitary. If the anterior part is destroyed, the animal will inevitably die within two or three days, a result precisely similar to that obtained by Paulesco, Harvey Cushing, and others, when operating on adult dogs by the lateral method.*

Although Horsley had occasion to perform on the human subject a certain number of operations for removal of tumours of the pituitary, his physiological experience in connexion with this organ had not the same influence in determining the corresponding surgical proceedings in man as had the experiments upon the brain. This was partly owing to the fact that tumours of the pituitary are rare, and that the methods for getting at the pituitary in the human subject are different from those employed for animals. Moreover, such tumours are often very slow-growing, and are not attended with immediate risk of life; whereas complete removal of the gland is dangerous if not fatal. And with regard to tumours of the thyroid, they can often be successfully treated without operation, and only occasionally pass from the hands of the physician into those of the surgeon. But I have, I hope, said enough about the physiological and surgical work of Horsley to illustrate the subject of this address, the close relationship that should exist between Physiology and Surgery. Horsley himself laid particular stress upon this. Mr. Paget tells us that when in January, 1911, the first Lannelongue prize—which was to be awarded once in five years to the surgeon who in the previous ten years shall have done most for the advancement of surgery—was presented to him:

"He spoke a few words of thanks . . . and said that his own country, which had long been under the influence of John Hunter, had later come under the influence of Claude Bernard, who had joined together physiology and surgery. That is what I have striven to realize. Unfortunately if surgical science advances with fair rapidity, its practice progresses slowly. That is because we are held in bondage by tradition from which we have difficulty in freeing ourselves."

Clearly he meant by this the supposed dependence of surgery on anatomy, when he himself so clearly saw that it is physiology which it must in future depend upon, or only so far on anatomy as mechanical considerations may render necessary.

William Sharpey.

I am now going to give you an illustration of the advantage of the association of Physiology and Surgery from the career of the most eminent surgeon of our generation, Joseph Lister. Lister was essentially and fundamentally a physiologist. He was easily the most distinguished pupil of William Sharpey, and William Sharpey was unrivalled as a teacher of physiology. This is the more strange, since Sharpey himself did little or no original work in the subject. Nevertheless, no one gave more encouragement to his pupils to conduct physiological inquiries or more sympathy in their researches than he. The failure on his own part to carry out physiological investigations was due to his training. This was wholly anatomical. When he went to study in Germany it was Rudolphi's dissecting room he frequented, not Johannes Müller's lecture room and laboratory. Had he attached himself to the last named, he would have consorted with all the great German physiological workers of the middle of the last century—Helmholtz, du Bois-Reymond, Ludwig, Brücke: or had he gone to Magendie in Paris instead of to the anatomical and surgical schools there, he would have consorted with Claude Bernard, would have become the outstanding physiological investigator in Great Britain, and would have occupied the place in London which Bernard occupied in Paris. But the tendency of the Edinburgh School in his day was wholly in the direction of anatomy, doubtless owing to the fact that the anatomical chair in Edinburgh has always been occupied by a succession of pure anatomists; whereas, although there existed a chair of physiology even prior to that of anatomy (rightly known as the "Institutes of Medicine"), it was never held by a physiologist until the appointment of Rutherford in 1884, of whom I am myself the unworthy successor. Fortunately we have illustrious examples to the contrary now, but the anatomy of those days exercised an influence upon its devotees which was not favourable to active research and least of all to experimental work. It must further be remembered that Sharpey was actually a lecturer on pure anatomy in Edinburgh when he was invited to occupy the chair of general anatomy and physiology at University College. Up to that time he had not taught physiology, nor had he received any training in it, although he had interested himself in certain physiological problems, especially those connected with the growth of bone and the action of cilia. It was too late for him to undergo a fresh course of training, and he was busy with his new duties. He had, therefore, to get up his physiology as best he could. The Council of University College would have done well if it had given him a free year to study physiology in France or Germany, but in those days there seemed to be no idea that anything of the kind was necessary: the governing bodies of universities rarely do the right thing in these matters! So Sharpey had to be content to teach a subject in which he was only self-trained. The more credit to him that he became so successful. For it is certainly due to his teaching, both directly and through his pupils, that the physiology of the latter part of the nineteenth century became preponderatingly an English science. I trust we still remain in the forefront, but we must admit that other nationalities have during the last five and twenty years made notable advances and are able to challenge any predominance we may have had.

Lister: Physiologist and Surgeon.

If I have been led away by the reverence I have for his memory to speak at greater length of Sharpey than I had intended, I have justification for doing so because of his intimate connexion with Lister.

Lister, long before he was a surgeon, was an experimental physiologist, and he continued to be one throughout his whole career. He had had no opportunity of being trained in experimental work, but he was a born experimentalist and trained himself. Whether he would have done better to have worked with Claude Bernard in Paris or with Carl Ludwig in Leipzig must be a matter of opinion, but his self-training had at any rate the advantage of developing his originality. His first scientific investigations were made with the aid of the microscope—an instrument with which he had, through his father, the discoverer of the achromatic lens, been familiar from his earliest days. He was amongst the first to demonstrate the existence of a dilatator pupillae in the iris and to show that, like the sphincter pupillae, which was already known, the dilatator is composed of plain muscle cells. Many later observers, less skilful or less accurate than Lister, have denied the existence of this muscle, but his work has been vindicated and confirmed by the most modern methods of physiology and histology. He also published observations on the arrectores pilorum which confirmed those of Koelliker, and are especially remarkable because he used a new and now universally employed method—that of microscopic sections—for the investigation. Doubtless the student of the present day, familiar with paraffin-soaked tissues and mechanical microtomes, would despise the rough mode of preparation used by Lister, and thus described by him:

"A portion of shaved scalp being placed between two thin slips of deal, a piece of string is tied round them so as to exercise a slight degree of compression; the preparation is now laid aside for about twenty-four hours, when it is found to have dried to an almost horny condition. It then adheres firmly by

* The details of this method will be published in the next number of the *Quarterly Journal of Experimental Physiology.*

its lower surface to one of the slips, and thus it can be held securely, while extremely thin and equable sections are cut with great facility in any plane that may be desired. These sections when moistened with a drop of water and treated with acetic acid are as well suited for the investigation of the muscular tissue as if they had not been dried."*

The existence of such cells in plain muscle had been denied by Ellis in a paper published in the *Philosophical Transactions*, although Koelliker had produced abundant evidence to the contrary. And every student can now easily demonstrate them. But in those days it was not so easy, and the fact that Lister undertook a difficult investigation and succeeded so admirably in obtaining a definite result placed him at once in the first rank of physiological histologists.†

Although these observations were not in themselves purely physiological their importance is entirely so, and had this not been the case it is doubtful if Lister would have spent so much time and trouble over them. It is interesting to remark that both investigations were inspired by the work of Koelliker, who was the predominant histologist of his time, but whose training and early work were physiological. Koelliker was an intimate friend of Sharpey, and it was through Sharpey that Lister made his acquaintance. Incidentally I may, perhaps, be allowed to mention that it was through Sharpey that I myself made the acquaintance and experienced the constant and kindly encouragement of both Koelliker and Lister.

The distinctively physiological bias of Lister's mind was soon to be evidenced—(1) by his work on absorption from the intestine and on the flow of chyle in the lacteals, and (2) by his researches on the vascular changes accompanying inflammation. The first of these researches were made in 1853 while he was still in London, and shortly after he had graduated. Their chief object was to ascertain whether solid particles mixed with the food can be absorbed by the lacteals. He observed these vessels in the mesentery of the mouse, and the conclusion he came to was that no such absorption occurs—a conclusion which has never been modified since. The experiments on inflammation were made, or at any rate completed, after he had been definitely established as a young surgeon in Edinburgh; a place he visited on Sharpey's recommendation in 1853, with the intention of spending a month there; but he became Syme's assistant and later his son-in-law, and the month extended to seven years!

Having become conscious of the ignorance of surgeons regarding the earlier stages of inflammation, he set to work to investigate these on physiological lines. For this purpose he made use chiefly of the frog's web, but employed also for confirmatory evidence the vessels in the bat's wing—an object he had learned the study of under one of his most distinguished teachers in University College, also a physiolcgically-minded surgeon, Wharton Jones, the discoverer of the amoeboid movement of leucocytes. As his biographer truly remarks, Lister's work on inflammation "impresses the reader by the beauty and simplicity of the experiments described, the originality of the thoughts and the soundness of the reasoning. . . . The paper was well received at home and on the Continent, and its conclusions have with scarcely an exception stood the test of time."‡

In the same year Lister published, also in the *Philosophical Transactions*, results of experiments of a purely physiological nature—namely, "An inquiry regarding the parts of the nervous system which regulate the contraction of the arteries," and on the "Cutaneous pigmentary system of the frog." Both of these contained new and important observations. It is, however, not unnatural that his predominant work, which has revolutionized Surgery, should have overshadowed his earlier physiological observations, a fact which Lister himself recognized and regretted. I am not sure in my own mind that he was not prouder of his physiological researches than of his contributions to surgery.

His most important contribution to Physiology was when he was very fully occupied with surgical work and teaching. It was upon a subject which must always possess a peculiar interest for the surgeon—the cause of blood coagulation. I know of no better or more precise piece of work than this. All kinds of theories were extant on this subject: there are a good many still. Dr. Benjamin Richardson, having found that the addition of ammonia to blood would prevent its coagulation, thought that this furnished sufficient evidence to support the idea that the reason why blood coagulates when drawn is that exposure to air allows the escape of ammonia. And although the researches of Alexander Schmidt had shown, what modern investigations have confirmed, that coagulation is the result of a chemical reaction between substances dissolved in the blood, the reason why this reaction does not occur in the living vessels was completely obscure; the theory which was most favoured being that of Brücke, which explained the phenomenon by supposing that the living wall of the vessel exercises a restraining influence upon the blood in contact with it—which is evidently not an explanation at all. Lister devised a simple experiment which at once upset both theories, and indicated the real cause of blood coagulation—namely, the contact of blood with foreign matter or with injured or dead tissues. He showed that blood can be kept fluid in a segment of a large vessel exposed freely to the air, and could even be poured from one such segment to another so as to allow free escape of any ammonia which might be (but isn't!) present; moreover, while passing through the air the blood would, of course, be removed from contact with the wall of the living blood-vessel. Nevertheless, such blood remained fluid unless the inner coat of the vessel were injured or unless the blood were allowed to come in contact even within the vessel with a foreign body. Lister showed that it is the presence of the injured tissue or foreign body that determines the chemical reactions which produce the coagulum, and not the presence of the living tissues which prevents such reaction. This fundamental fact was settled for all time by the simple experiment of the so-called "living test tubes" devised by him. The account of this and many other experiments on the subject is to be found in the *Proceedings of the Royal Society* for 1863. It formed the subject of the Croonian Lecture for that year.

Lister on the Need of Experiment for the Advancement of Medicine and Surgery.

By this time Lister was in the full swing of surgical practice in Edinburgh, and was giving lectures on the Principles and Practice of Surgery in the extramural school. The principles he taught were physiological, both normal and as applied to disease. And he recognized that Surgery if it is to be considered a science at all must be founded upon and can only make progress by the aid of experiments.

His great discovery was so founded. His experiments were made with test tubes, with animals, with patients. But he would never venture to perform a serious experiment upon man without having ascertained by animal experimentation that it was likely to prove successful and was therefore justifiable. On the subject of vivisection his trumpet gives no uncertain sound. When requested by no less a personage than Queen Victoria to make some public declaration against vivisection he replies as follows to her private secretary:

> "I should deeply regret that I cannot see my way to complying with this request, were I not persuaded that my doing so would not promote the real good of the community, which I know to be Her Majesty's only object in the matter. And I feel bound to endeavour to express shortly the reasons for my opinion.
>
> "With this object I can hardly do better than begin by saying that I have myself often performed experiments upon the lower animals, and that, if I have been privileged in my professional career to do anything for the good of my fellow men, more is to be attributed to these experiments than to any other work in which I have engaged. When they were performed without chloroform, as has not unfrequently been the case, they have been done at a very great sacrifice of my own feelings; but the greatness of the object in view has appeared to me to over-ride such considerations. . . . It is sometimes said that, although such experiments may be needful and right for the purposes of discovery, they are not justifiable for the demonstration of truths already ascertained. It would, I believe, be very wrong to draw any such line of distinction. To take a single instance: to debar the student of medicine from having his eyes opened to the truth of the circulation by seeing the blood coursing through the vessels

* Quoted from *Lord Lister*, by Sir Rickman Godlee. 1917.

† The earlier papers on this subject were published in the *Quarterly Journal of Microscopical Science* for 1853: the fuller investigation in the *Transactions of the Royal Society of Edinburgh* for 1857.

‡ The actual mode of causation of the vascular changes which Lister was the first to describe was not explained until many years later, the explanation being furnished by the experiments of Dr. Ninian Bruce. (*Quart. Journ. Exper. Physiol.*, vol. vi, p. 339, 1913.)

of the living web of the frog's foot, would be undoubtedly a mistake: for no amount of verbal teaching could do for him what a glance through the microscope at that sight at once effects."

And after explaining at considerable length the relatively painless nature of physiological experiments as compared with the cruelties which are inflicted every day for the sake of improving the quality or appearance of food, or even in sports such as fishing, shooting, and fox-hunting, he points out that the sportsman is not commonly regarded as cruel because the inflicting of suffering on the hunted animal is not his main object (which is indeed merely the gratification of himself and his friends), and continues:

"But surely those who regard this amusement as justifiable are strangely inconsistent if they brand with the epithet cruel the man who performs an experiment upon an animal at great sacrifice to his own feelings and with every care to render the pain as slight as is compatible with the high object in view."

And in his evidence before the Royal Commission (on November 1st, 1875) he begins by stating that his first experiments upon animals had been made when he was altogether unknown as a person of any sort of reputation whatever: and "When I first took in hand to teach others I felt that there were some points on which I desired more information than I could get satisfactorily from any book, and my first experiments were performed with the object of preparing myself for teaching, while I was not a person of recognized scientific attainments."

With regard to his early experiments upon blood he remarked that they "had the effect of giving me a kind of pathological information, without which I believe I could not by any possibility have made my way in the subject of antiseptics; and that subject, I believe, is becoming recognized as one of considerable practical importance. I have often felt that without the basis which I derived from experiments on the lower animals, I should never have been able to thread my way through the very perplexing and apparently contradictory facts which I met with in the first instance." Also that throughout his whole career after that time he had found experimentation on living animals necessary, and that through the medium of that experimentation originally commenced with other aims he was gradually led "to the development of that method of treatment which is now known as the antiseptic system." Further, with regard to his work on catgut ligatures he definitely states that if he had not made experiments in the first instance on animals he would have had to perform them on man; there was no other alternative.

Lister and Pasteur.

Great as was his work in surgery, Lister never ceased to be a physiologist; to the end of his days he was deeply interested in all forms of experimental work. He was scientific to the core. As we have seen, he insisted that experimental work was the basis of all his researches in antiseptics. His experiments in this as in other directions are characterized by meticulous accuracy, a character which is essential for all scientific investigations. First the facts were ascertained by observation and experiment; then marshalled and collated with observations made by others; the deductions checked by yet other experiments; nothing was left to mere supposition. In this way he arrived at his great generalization which at once transformed surgery from a mere art which might be practised by any ignorant person into a real science which could only be properly advanced by those who adopt the experimental method. Given an adequate knowledge of anatomy—a science which is essential to the physician as well as to the surgeon—the basis of training in both the branches of what is popularly known as the "healing art" must be physiology. Lister would never have arrived at the position he occupies in the history of surgery if he had not been first a physiologist. Doubtless he was fortunate in his opportunity. He came at the right time, just when Pasteur was engaged in the brilliant researches which indicated the essentially parasitic nature of disease. How eagerly Lister seized hold of that opportunity we read in his biography, and his own tribute to the aid he obtained from the researches of Pasteur is unstinted; nevertheless, he had begun his experiments before he had heard of Pasteur's. I do not know any surgical contemporary of his who could have taken advantage of the opportunity thus offered; at any rate it is certain none of them did so. They all had anatomy at their fingers' ends, but this was the only science which it was then expected they should know, and it did not lead their surgery far along the path of progress.

Physiology the Basis of Surgery.

It is an old tradition that Anatomy is the exclusive basis of Surgery, but I am happy to think it is every day becoming more of a tradition and less of a practice. Many modern surgeons both in this and in other countries are physiologists as well as surgeons: Physiology has given scientific support to their Surgery, and has been in turn materially assisted by it. It would be invidious for me to mention the names of living individuals, and in an assembly like this it is not necessary: they are known to most of you. Their researches are becoming every day more numerous. They admit that Surgery is based upon experiment, in other words, upon Physiology, and that there is no possibility of its advancing in any other way. Like every other science, surgery without experiment must stand still, and no surgeon has any right to experiment upon the human subject if the lower animals are available for the purpose. That those who are learning operative surgery are debarred by Act of Parliament from practising on animals, although permitted to make any experiments they think fit upon human patients, is an incredible piece of folly, and ours is the only country in the world in which so heinous a measure could have been passed into law; the only nation where misplaced sentiment is allowed to displace reasoning, and where the necessities of humanity are subordinated to those of the brute creation. I wonder, does the public fully understand that by the present law no student is permitted to perform any operation upon an animal with the object of enabling him to do the same operation upon man, and to acquire the necessary skill to do it without danger to his patients. Which of you, I may ask, would like to be a first patient to be operated on, even for so simple an operation as the extraction of the crystalline lens? Yet the skill of the operator *must* be acquired by experience, and therefore men, women, and children must take the place of dogs, cats, and rabbits! Truly we are a nation of Pecksniffs! As Sir Rickman Godlee pertinently remarks, the strangest anomaly, as it must appear to our less sanctimonious brethren in the rest of the civilized world, is that our law, while it forbids the granting of a special licence to a distinguished doctor to experiment on a chloroformed frog in his own study in pursuit of science, allows anyone who can afford it to hunt a stag to death, or set two greyhounds to course a hare, and wager money on the result.

While it is the case that the progress of surgery must depend upon physiology, it is equally true that the progress of physiology depends upon surgery. Without an adequate knowledge of surgery many experiments which are necessary for the advancement of physiology could not be attempted. I have already given you instances of this. But I will call to mind the experiments on depancreatized animals which are at present in progress—experiments which are filling not only the pages of the medical and physiological journals but even the columns of the daily press. It is not everybody who is endowed, as Lord Lister and Sir Victor Horsley were, with the requisite knowledge and skill in both subjects to work single-handed. At the present time team work, suitably directed, is all the vogue; and this is largely why our knowledge regarding insulin has made such rapid advances within so short a time. Surely such a combination of physicians, surgeons, physiologists, biochemists, pathologists has never before been assembled to conduct any investigation as those who have been working in Toronto. In every physiological investigation on animals one of the team at any rate should be a surgeon, and I can conceive of no more advantageous training for a young surgeon than that which he will obtain by taking part in such an investigation.

Examples of the mutual value of co-operation between

the surgeon and the physiologist could easily be multiplied, but I hope that those I have put before you may suffice, and have some influence in promoting that close intercourse between surgery and physiology which is essential for the progress of both branches of science.

Listerian Methods in Surgery.

I have often wondered what difference it would have made to my own life if Joseph Lister had been elected to the chair of surgery in University College in 1866, instead of John Marshall. It is easily the worst mistake that the Council of the College ever made. The echo of the election was remaining when I joined the College in the winter of 1866 as a very young student. I came to know Marshall very well. He was a good friend to me and I had a great respect and liking for him. But he was the most uninspiring teacher that I ever sat under. His systematic lectures were desperately dull, and being given late in the afternoon with a monotonous, musical utterance, most of his audience were soon fast asleep: I was one of the sleepers! Nor was his clinical teaching any better. His operating was slow and the reverse of brilliant. Whether he ever fully embraced Listerian methods—at the time I joined they were unknown outside Glasgow—I do not certainly know, but I much doubt if he did. He was not a physiologist although he published a textbook of physiology, largely founded on his notes of Sharpey's lectures: I do not think it went through more than one edition. Lister's biographer speaks of Marshall as scientific and a good teacher, but these are terms which I cannot endorse. He had a charming personality, and as he was already on the staff of the hospital he obtained the chair in preference to Lister, who had been many years away from the institution and was unknown both personally and through his work to most of the staff. John Marshall became a Fellow of the Royal Society and President of the Royal College of Surgeons. There is an admirable bust of him at Lincoln's Inn Fields. But Lister's name will be famous when Marshall's is forgotten.

It has always been a source of regret to me—as it must be to all alumni of University College—that Lister's work was not carried out at his old school. But the fates ordained otherwise, and to Glasgow and Edinburgh must be conceded the credit of nursing the new surgery into vigorous existence. I believe it would have made a great difference in the rapidity of the spread of the new doctrines if they had emanated from London, and Lister, no doubt, thought so himself, as his subsequent migration to London showed. The atmosphere of University College—if not of the hospital—was distinctly scientific, and at any rate amongst his scientific colleagues he would have received full encouragement. It was in 1866 that he applied for the appointment—less than a year after he had started his experiments on antiseptics in Glasgow. According to Horsley it was sixteen years (1882) before it was in general use in hospital surgical practice in London. The change occurred when Horsley was a student and long after my own time. And if I have wondered what a difference it would have meant to me, a mere physiologist, to have had a surgical training under Lister, how much greater would have been the difference to Victor Horsley if he had come under the direct influence of this great scientific surgeon. He would have been Lister's house-surgeon instead of Marshall's, and how enormously he would have benefited by the close relationship with Lister, and how keenly he would have followed and assisted in his experiments, those who best know both men can appreciate!

It is easy to speculate on the "might have beens." Sufficient to know that as soon as he came into his own Horsley was foremost in his adoption of Listerian methods, and it was in consequence of this that that particular combination of surgery with physiology which I chose as my first illustration of the mutual benefits they confer on one another was effected. If Lister had come to University College in 1866 I should have learned his methods from the master himself, but I should have missed the opportunity of being associated with so delightful a colleague as he whose memory we are assembled to-day to commemorate, and whose loss not only to physiology and surgery, but to the whole world, will be felt for many a year.

An Address
on
CHRONIC INTESTINAL STASIS AND CANCER.*

by

Sir W. ARBUTHNOT LANE, Bt., M.S., F.R.C.S.,
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At present surgery and medicine appear to be one horrible mêlée of attempts to understand and treat end-results, little or no endeavour being made to obviate the development of these conditions. In surgery operations increasing in severity replace less extensive procedures; whereas in such a condition as ulcer of the stomach, while no attempt is made to remove the factors which produce it together with many necessarily associated results, the possibility of the recurrence of the ulcer is only eliminated by the removal of the entire organ. The safety with which such operations can be performed, and the ease with which a surgeon can acquire sufficient skill to effect them at comparatively little risk, tend to increase the number and severity of these operations. Everyone worships the god "technique," to the complete elimination of the importance of dealing with the causation, and therefore the prevention, of disease which should be our real object in life.

The profession is only just beginning to realize the enormous part played by the defective functioning of the gastro-intestinal tract, the consequent fouling of the food supply, and the poisoning and deterioration of the tissues by septic material absorbed from the intestine.

Diet of Civilized and Uncivilized.

That we pay dearly for the luxury we enjoy in our food and habits of life is shown clearly by the fact that civilization brings in its train a very large number of diseased conditions which do not exist in those leading the simple life of the native. That these conditions are all due to acquired defects in the functioning of the gastro-intestinal tract is, in my opinion, undoubted, since they occur at once in the native when he is placed in a civilized community; and it can be shown that these diseases bear a direct proportion to the degree of civilization enjoyed.

Roughly the difference between the civilized and the uncivilized is a matter of diet. While the latter eat much food that is uncooked or only imperfectly cooked and which contains a large proportion of indigestible matter, the former eliminate from their meals all but the digestible. By this means the bulk of the food and its stimulating action on the intestinal wall are diminished as much as possible and the material stagnates and becomes poisonous. As evidence of these statements I will quote an extract from a lecture by a great observer, Colonel McCarrison. He spent nine years in the Himalayas, during which time he had a large practice, performing more than 400 capital operations each year. During that time he never saw one case of asthenic dyspepsia, of gastric or duodenal ulcer, of appendicitis, of mucous colitis, or of cancer. I would call your attention to this sequence, all evidence of chronic intestinal stasis, since I am certain that cancer is the last stage in the sequence, and that it never attacks a healthy organ. The diet of these people is very simple. They live chiefly on corn ground between stones. This is made into a cake which is imperfectly roasted over a charcoal fire. They very rarely eat meat. Mr. F. L. Hoffman the eminent American statistician writes me as follows: "Your views regarding dietary or nutritional causation (of cancer) coincide with my own based upon extensive research among native races. I recently returned from a trip to South America, where I lived for seven

* Delivered before the Guy's Hospital Physical Society, October 18th.

months among native Indians and mixed bloods. During the entire period not a single case of cancer was brought to my attention, although everywhere I inquired, although every doctor was asked the question, and although I personally came in contact with more than two thousand natives. The diet is very simple and the habits of the people are very regular."

Dr. F P. Fouché (British Medical Journal, June 30th, 1923) writes: "For six and a half years I was district surgeon in the Orange Free State. . . . During the whole of that period I never saw a single case of gastric or duodenal ulcer, colitis, appendicitis, or cancer in any form in a native, although these diseases were frequently seen amongst the white or European population."

Dr. Bernard Hollander, writing in the British Medical Journal, July 7th, 1923, says: "Thirty years ago I was interested in the causation of cancer when my friend, the late Sir Henry Morton Stanley, the African explorer, drew my attention to the fact he had observed, that the native races in the regions through which he had travelled were free from it. . . . only in coast towns, where natives mingled with Europeans, did cancer occur, and then only . . . one case in about ten or twelve years." Dr. Dyce Sharp (British Medical Journal, July 14th, 1923) fully confirms these statements as regards Northern Nigeria and Abyssinia.

I could furnish much more evidence showing that the freedom from any of the stasis sequence is due chiefly to diet, and to a lesser degree to the habits of these races. Place these people in a civilized community, as in the case of the American negro, and the diseases they suffer from are precisely those of the white man among whom they live and whose diet and habits they imitate.

Diet and Cancer.

I think I have proved that the primitive races, while living in their normal conditions and surroundings, are free from certain diseases of the gastro-intestinal tract and from cancer, all of which exist widely in civilization and are apparently becoming more and more frequent. This is so obvious in the case of cancer that much attention has been drawn to this particular stage of the stasis sequence and an enormous amount of money and time has been spent in endeavouring to find the origin of cancer. The chief cause of the failure of these efforts is the fact that cancer is not recognized as a part of a mechanical sequence and as never affecting a healthy organ, but is regarded as a primary condition. The cancerous cell will only grow in a suitable soil, and that soil is provided by the prolonged action of toxins in the tissues.

Chronic Intestinal Stasis.

I will now proceed to the description of the condition I called chronic intestinal stasis, and will endeavour to show how it runs parallel with civilization, producing misery and disease in a progressive and disastrous manner.

Many years ago, while walking over a bridge in Paris with my old friend Moynihan, he said to me, "You have completed your work on the treatment of fractures: why do you not turn your attention to the abdomen?" That remark sank into my brain and I went up to Leeds and saw the magnificent work he was doing in the school on which Mayo-Robson had shed so much lustre.

On my return to London I applied to the gastro-intestinal tract the same mechanical principles that I had formulated from the study of the changes which ensue in the bodies of labourers which I had employed in the treatment of fractures. They are the following:

1. Pressure produces changes in the structure and form of the bones and in the form and function of existing joints, while it determines the formation of new joints.
2. Strain produces change in the form of bones, and in the form of existing joints and also produces new joints.
3. When, apart from the exercise of pressure or strain, it is important, from the altered mechanical relationship of the individual to his surroundings, that a mechanism should be modified or an entirely new one developed, such a change takes place.

Its Mechanical Effects.

These laws show that we have a definite mechanical relationship to our surroundings, and that any variation in that relationship is followed by corresponding changes in our mechanism. In other words, this is the basis of evolution. Realizing the fact that civilization, because of the variation from the diet and habits of primitive man, meant constipation or the delay in the passage of material through the gastro-intestinal tract, I argued with myself as to what changes would develop in the viscera and in their attachment in order to obviate as far as possible the ill effects which must otherwise ensue from the stagnation of the contents of this tract. In the case of the large intestine to oppose the elongation and distension of the bowel it would be advantageous to strengthen the layers of peritoneum which secure the gut to the abdominal wall.

It is the habit in civilization to regard a single formed motion a day as the normal, so that the individual is habitually constipated for at least twenty-four hours, and the products of the food consumed during that period are accumulated in the large intestine, and in the first instance in its termination. Therefore strain is experienced first upon the outer layer of the mesentery which fixes the iliac colon to the floor of the fossa, and this strain is greatest about the junction of the iliac and pelvic segments of the colon. Corresponding exactly to this strain there is developed upon the outer surface of the mesentery, extending from its base, streaks or bands of peritoneum, fibrous in appearance. These spread gradually along its outer aspect and as they grow they contract and shorten this portion of the mesentery, so limiting the range of movement of the portion of intestine which it secures. Later this new growth of tissue, or the crystallization of lines of force, extends to the outer wall of the large bowel and gradually encroaches on its circumference. Not only does it pin the intestine immovably in the fossa, but by its progressive attachment to the bowel wall it rotates it upon its long axis and reduces its lumen very materially, and consequently obstructs the passage of faecal matter through it. The contents of this portion of the intestine are usually firm and often hard in consistency, so that it is easy to realize how difficult it may be for the faecal mass to negotiate this obstruction, even when it exists only in a moderate degree. Any interference with the free functioning of this portion of the bowel is a serious obstacle to efficient drainage, and the more marked the obstruction the greater the delay of material in the entire gastro-intestinal tract proximal to it.

To this particular obstruction I gave the name of the "first and last kink"—the *first* because it is the earliest to form, and the *last* because it is the lowest in the gastro-intestinal tract.

> I cannot exaggerate its importance, as I believe its capacity for harm is tremendous and far-reaching and that it is responsible for all the changes which are due directly and indirectly to chronic intestinal stasis. It spells the failure of civilization and is a veritable Pandora's box.

Consequent on the stagnation of material in the large bowel similar bands develop along the mesentery, securing the convexity of the loaded colon. These are most marked in certain situations, as at the splenic flexure, and again at the end of the ileum, where it is called the ileal kink. The secondary accumulation of material in the small intestine angulates the duodeno-jejunal junction, causing first dilatation of the duodenum and later ulceration of its first portion, spasm of the pylorus, dilatation of the stomach and its ulceration along the seat of strain—namely, the lesser curvature. This ulceration of the stomach tends readily to become cancerous.

The same tendency to the development of cancer occurs in the large bowel where angulated and obstructed, by acquired bands or by spasmodic action of the sphincter ani or of Mayo's circular band of muscle, in direct proportion to the degree of obstruction and to the increase in consistence of the faeces. The stagnation of the contents of the large

bowel also causes an inflammation of the appendix, which is frequently anchored and obstructed by acquired adhesions of the mucous membrane of the colon, producing colitis in its various degrees and forms. The appendix is often so secured as to control the ileal effluents and to increase the stagnation of the material in the small intestine.

Its Toxaemic Results.

Besides these mechanical results of stasis, the sequence of which is quite obvious, we have those which are consequent on the fouling by organisms of the dammed-up contents of the small intestine of the duodenum, and even of the stomach, with the extension of the infection along the hepatic and pancreatic ducts which produces gall stones and cancer. The mode of extension of the infection in these is as apparent as the mechanical changes.

The next series of changes we have to consider are those which come about by the absorption from the infected contents of the gastro-intestinal tract of more toxins, etc., than the liver is able to deal with. These noxious substances getting into the circulation are carried to every organ and tissue in the body and produce disastrous results in proportion to the degree of the toxicity of the blood.

The degenerative changes in the thyroid, adrenal, and other ductless glands, the heart and blood vessels, the nervous system, the eyes and ears, the kidneys, liver, pancreas, uterus, ovaries, testes, prostate, breast, fat, skin, hair, lymphatic tissue of the naso-pharynx, and the gums and teeth—these two last being the most frequent and conspicuous of all—I have frequently described in detail, and I have shown how liable certain of these degenerated organs, such as the breast, uterus, ovary, and pancreas, are to be infected with cancer.

Among the nervous symptoms may be mentioned intense headache, neuritis, neuralgia, sleeplessness, misery, complete mental and physical prostration, melancholia, epilepsy, disseminated sclerosis, delusions, and dementia praecox.

Besides these changes, which are the direct result of the supply of toxic blood to the tissues, we have a number of infections which occur because of the inability of the degenerated tissue to withstand their inroad. These infections are all of such a nature as to be unable to obtain a foothold in a normal healthy subject.

Cancer never Affects a Healthy Organ.

Perhaps the most conspicuous at the present moment is cancer. In every case in which I have had an opportunity of verifying it I have found that the cancer patient was suffering from chronic intestinal stasis and that the infection by cancer was an indirect consequence of this condition.

If this assumption is correct it is obvious that to prevent the development of cancer it is necessary to obviate these changes which result in the gastro-intestinal tract from the diet and habits of civilization. That an enormous amount of benefit and a corresponding freedom from cancer has been obtained by the use of paraffin is in my opinion undoubted. I started to employ paraffin when I recognized the mechanics of chronic intestinal stasis, and have used it in every case since, as it would have been impossible and unnecessary to operate on all patients suffering from this disability. Its usefulness is also confirmed by the extraordinary manner in which it has spread over the whole world. I doubt whether any other material or drug has ever given anything like the same comfort and security from disease that it has. By its use the irritation and harm which result from the action of a purgative are avoided, while it acts on the principle of the flushing tank, rendering the motion soft and ensuring two or three free actions a day.

The other diseases that affect the subjects of chronic intestinal stasis are rheumatoid arthritis, Still's disease, tubercle, Raynaud's disease, many splenic affections, ulcerative colitis, many skin diseases, diabetes, ulcerative endocarditis, gout, etc.

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Prevention of Stasis.

Our chief interest at the present time is to prevent the development of chronic intestinal stasis and so to obviate the development of the several conditions which are due directly or indirectly to its presence, of which latter group cancer interests the public particularly because of its frightful mortality and the physical and mental anguish so frequently associated with it.

How is this to be done? It can only be effected by a complete revolution in our diet and in our habits of life. We must assimilate them to those of the natives, among whom the entire stasis sequence is unknown. How this can be done with as little sacrifice of the pleasures of the table must be investigated by dietetic experts, to whom the problem should not present insuperable difficulties. It must necessarily be a compromise, but the more thoroughly we approach the conditions of primitive life the more successful shall we be in avoiding the incidence of a very great number of diseases.

Roughly, it would seem that the diet should consist as much as possible of vegetable matter, that it should be consumed largely in a raw state, to avoid damage to vitamins, that coarse indigestible material be retained in order to increase the bulk of the intestinal contents and their stimulating action on the reflexes, that food which if kept becomes offensive and poisonous should be eliminated as much as possible, and that the consistence of the faeces be diminished, and the frequency of their evacuation increased.

Simple Operative Treatment.

So much for the prevention of stasis. As to the treatment of the existing condition apart from medical treatment by a Curtis belt, paraffin of high viscosity, kaolin, and abdominal exercises, all operative measures on any portion of the gastro-intestinal tract should be started by an examination of the last kink, and by the careful freeing of this bowel from its acquired attachment to the iliac fossa. This requires to be done thoroughly, and when the mesentery has been restored to its normal length and the bowel to its normal freedom any raw surfaces of mesentery must be *accurately covered by peritoneum* to obviate any recurrence.

Perhaps of all operations in surgery this procedure alone is followed by the most wonderful effect. The whole condition of the patient is transformed and he is rapidly restored to vigorous health. After all this is not surprising, since it is because of this obstruction that all the other changes in the gastro-intestinal tract, whether mechanical or tonic, ensue.

To my surprise I have on very many occasions secured the same advantage by this simple operation that I have previously obtained by colectomy at a considerably greater risk. Because of the remarkable results which can be obtained by this procedure I am anxious that its value should become recognized.

Having dealt with the last kink the colon should be examined to make sure that no secondary constriction has developed, and particularly in the region of the splenic flexure. Any acquired band found controlling the lumen of the bowel should be divided carefully, avoiding leaving any raw surfaces deprived of peritoneum. An inflamed or controlling appendix in an ileal kink should be looked for, and dealt with if present.

I do not propose to discuss the surgery of ulcer of the duodenum and stomach, but I would like to state that the duodenal distension, pyloric spasm, and gastric dilatation disappear very rapidly after this simple procedure. I hesitate to say what I believe to be the case of its effect upon duodenal and gastric ulcers till I have been able to confirm my views by a much larger experience, but I am convinced that the employment of the common-sense measures I adopt will reduce very materially the frequency and severity of operations on the upper portion of the gastro-intestinal tract, and will free the sufferer from a large number of the consequences which ensue directly and indirectly from chronic intestinal stasis and from the auto-intoxication which results from it.

Cameron Prize Lectures

ON

THE PRESENT POSITION OF THE VITAMIN PROBLEM.

DELIVERED IN THE UNIVERSITY OF EDINBURGH, JUNE 27TH AND 28TH, 1923,

BY

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LECTURE II.—RICKETS AS A DEFICIENCY DISEASE.

IN this lecture I propose to consider the evidence obtained in the course of recent experimental studies, which shows that a specific dietetic deficiency plays an important part in the causation of rickets. There seems no doubt that a vitamin is involved in this deficiency or I should not now be dealing with the matter. The evidence for this claim doubtless needs closer scrutiny than was necessary in the case of certain nutritional failures dealt with in the previous lecture. For this very reason, however, I have chosen rickets as the subject of my second discourse. It is well to avoid the danger of suggesting that in such studies experimental results are always easily obtained or interpreted, especially when the reproduction of a particular disease as defined by clinicians is in question. I do not think you will deny, however, that in its final outcome the experimental study of rickets has fully justified its pursuit. Another reason for my choice of subject to-day is the desire to pay a public tribute to the work of a friend whose successful efforts to throw light upon the etiology of rickets have, I feel, lacked proper appreciation in certain quarters.

The history of the recent experimental studies of rickets and of the conflict of opinion to which they have led is in itself interesting and instructive. Honest opinions held in good faith have sharply differed. Yet the ascertained facts are now grouping themselves in such a way that both sides in the conflict may come together with flags still flying. Each side has been right, but neither side (because of the tendency to take too narrow a view) has been quite right. I would like, perhaps, just to add that I think this qualification applies especially to the side which is not my own.

There have been many views concerning the origin of rickets, but of these three only need be in your minds. One has looked upon various defects in hygiene as responsible for the disease, but from these defects faulty diet has been, on this view, expressly excluded. A second view has attached, on the other hand, a special importance to diet. It is this view, of course, in its most modern form, which involves the conception of a specific food deficiency, that I am here to support. The third view has postulated infection as a factor in the causation.

In 1908 Dr. L. Findlay published the results of experiments upon dogs which, together with his experience as a clinician, led him to conclude, alike on experimental and clinical grounds, that confinement, with consequent lack of exercise, is the main factor in causing the disease. In 1919 appeared as one of the reports of the Medical Research Council the results of an important study carried out in Glasgow by Miss M. Ferguson. This work was inspired by Professor Noël Paton, and was published with an introduction by Dr. Findlay, who had himself carried out, several years previously, a similar investigation. Miss Ferguson's study involved a careful comparison of the economic conditions in rachitic and non-rachitic families respectively. It dealt with hundreds of families of which the food budgets and housing conditions were studied with great care. The general conclusion arrived at was that inadequate air and exercise were the most potent factors in inducing the occurrence of rickets. It was held proven that diet played no essential part in the etiology of the disease. Upon these experiments and observations, supported by some others made more recently, are based the views of what is sometimes called the Glasgow school.

In direct conflict with these views were the results of Edward Mellanby's experiments, of which a preliminary account appeared about a year after Miss Ferguson's report, though they had then been long in progress. I feel it incumbent upon me to insist strongly upon the importance of the work of my friend and former pupil, because in certain quarters at least it was received with somewhat carping criticism, still not frankly withdrawn. Moreover, not all among the more recent experimentalists, whose work took origin from Mellanby's, and has in effect confirmed it, have given him sufficient credit as a pioneer. The earlier and chief part of Mellanby's work was done at Cambridge, with support from the Medical Research Council. Although I had no hand in it, I can testify to the care with which it was done and to the patient enterprise it involved. Mellanby was blamed at the outset for making public claims before his experimental results had been fully published; but I think we should all sympathize with the dilemma of young investigators to whom priority is important but who yet suffer from a praiseworthy desire to polish their work before publishing it. There was plenty of evidence behind Mellanby's first statements. The Medical Research Council was also blamed at this time because in the first edition of the monograph, for which the Council is responsible, dealing with accessory food factors, a claim, supposed to be premature, was advanced for the importance of a dietetic deficiency in the causation of rickets. I do not think, however, that there will be anything to withdraw on the appearance of the second edition of the monograph—which is imminent—though there are many facts, derived from various lines of study, to supplement what was said in the first edition.

Mellanby's main observations were made upon puppies, and one minor criticism of his method was that in comparative experiments he did not generally use individuals from the same litter. This may appear a small point, but it is one of some interest to which I should like to devote a moment. It is known in the case of several metabolic anomalies — alkaptonuria, for example — that they are inherited on Mendelian lines. I have recently seen at Cambridge an illustration of such inheritance in the case of an anomaly which was not apparent till the metabolism was experimentally studied. I will not be more precise in my reference as the observation is not mine and is not yet published. But suppose among dogs there exists a sharp variation in susceptibility to rickets (and this would seem to be the only justification for insisting upon the use of puppies from one litter), then if by chance either relative immunity from or hypersensitivity to rickets were a recessive Mendelian character, which from what I know seems by no means impossible, segregation might have occurred in the very litter chosen for experiment. This might entirely upset experimental comparisons. Two puppies from one litter may, of course, be more alike than any two not so related. They may, on the other hand, in respect of a particular character, show exceptionally sharp contrasts. For studies in metabolism I would choose, whenever possible, dogs of the same breed and age, but I would rather select from an average population than from the same litter. This, however, is a digression.

Mellanby, as I have said, has worked on a large scale, and must by now have employed in experiments nearly 500 dogs. His general plan of work was on the following lines. Having established a standard diet which could be relied upon to produce rickets in puppies—an end that could be attained without much difficulty—he replaced one constituent of this diet by other material and observed the effect in respect of the development of rickets. In particular he exchanged one form of fat for another, and found that, while one fat might have little or no preventive power, another might prove strongly prophylactic. He found, further, that the fats most potent in this respect were those which on other evidence were known to contain the highest proportion of vitamin A. As I can testify, Mellanby arrived at this result without bias of any kind. It was originally unexpected by himself. I ought to mention that for the diagnosis of rickets he employed, apart from the general appearance of the animal, *x*-ray photography, histological examination, and also estimations of calcium in the bones.

Mellanby found that cod-liver oil was particularly potent in the prevention and cure of the experimental rickets. I

one set out to deal adequately with the question of cod-liver oil therapy in rickets much would have to be said. I will content myself with mentioning such facts as bear directly on the vitamin question. Since the work of Hess and Unger on negro children, and that of Mellanby on dogs, further and conclusive evidence has been gathered to prove that cod-liver oil is a prophylactic against rickets. Its influence in this respect is indeed most remarkable. It was the confirmed belief of many physicians, especially of the French school, and this long before the experimental era which we are considering, that cod-liver oil could also cure the disease, and at the moment I think almost everybody believes that its curative power is considerable. The question arises, however, as to what is the active agent in the oil. Mellanby's evidence seemed to show that it might be vitamin A, though he himself did not dogmatize on this point. Certain it is that if the curative factor be not vitamin A its distribution in fats and other materials is closely similar to that of the said vitamin, and when the latter is concentrated by fractionation of cod-liver oil the antirachitic factor is found in the same fraction (Zucker, Johnson, and Barnett). Nevertheless, as you are to hear, it is now likely that the two are not identical. It will be convenient, therefore, if for the moment I speak simply of fat-soluble vitamins.

In the years 1920-21 several observers, too numerous to quote, reported failures to obtain definite experimental rickets in animals as the result of simple deprivation of the vitamin or vitamins associated with fats. They did obtain, however, osteoporosis of the bones, indicating that in the absence of such vitamin or vitamins the body cannot deal normally with its mineral supply. There was nothing surprising in the failure to produce true rickets under these conditions. As Mellanby pointed out long ago (having to recognize the circumstance as a factor in his own experiments), typical rickets, showing the classical changes in the ossifying cartilages, is essentially a disease of growth. If the animal does not grow the typical histological changes are not developed. Now the vitamin A, because of some influence exerted in the body much more general than any effect upon ossification, is essential to growth: hence a somewhat remarkable impasse for the experimentalist. There are suggestions that a fat-soluble vitamin prevents rickets, but when the point is tested in what should be the clearest type of experiment—that is, one in which the diet is made wholly free from any such factor—the circumstance just mentioned intrudes. There is no growth, and therefore no rickets. It would seem as if either the presence or absence of a vitamin prevents rickets! This is not the paradox it seems. In the first place it is, as you will admit, quite an artificial though clinically convenient custom to treat a disease like rickets as an entity. If, however, we do this and give the disease a name, clinicians are perhaps justified in insisting that certain accepted criteria, empirically chosen, must all be present when we claim to have established the disease experimentally. Now in order that faulty diets should establish typical rickets in this sense it is necessary that there should be a certain quantitative balance among the factors concerned. No one has recognized this more clearly than Mellanby. It is, indeed, a point upon which he more than any other has insisted, though it is emphasized by much recent work. But since we are considering vitamins and their general influence on the body the significant thing is that in the absence of some such factor the mineral metabolism as well as other aspects of metabolism is abnormal. This is seen in the diminished deposition of calcium in the bones even when the classical picture of rickets is absent. It is noteworthy, moreover, that bone changes due exclusively to the absence from the food of vitamin-containing fats may after all, in certain animals, upon diets suitably balanced, assume the typical appearances of rickets.

The pioneer work of Mellanby upon dogs was followed a good deal later by that of Korenchevsky upon rats. This author found that, providing the deficiency were made sufficiently severe—for instance, when the mothers as well as the offspring were deprived of the specific factor—the young developed a condition in all respects similar to rickets. I wish I could devote more time to Korenchevsky's interesting work, which should be studied by all who wish to appraise properly the available evidence concerning the point at issue. Goldblatt has extended the work and has shown that in the case of young rats which, by suitable feeding of the mother, are made to start life with an abnormally small store of the fat-soluble organic factor, grading the amount of that factor in their diet results in a corresponding grading in the amount of calcium deposited in the bones.

I have already pointed out that Mellanby has never asserted that the antirachitic factor present in certain fats is identical with the vitamin A, but only that its distribution is similar. In 1922 the results of some observations were published by McCollum and his colleagues which go to show that the vitamin necessary for the maintenance of growth and the prevention of keratomalacia is distinct from that which controls the proper deposition of calcium. The former is vitamin A; the latter, though it certainly comes under the only available definition of a vitamin, being a food constituent potent in minute amounts, we may with Edwards Park call the antirachitic "X." The proof of this distinction was obtained by oxidizing cod-liver oil by means of a current of air. This, as I myself showed a few years ago, results in the destruction of vitamin A. The American authors found, however, that after such treatment the oil, though it always fails to support growth, is still potent as a prophylactic against rickets. The antirachitic substance is less easily oxidizable than the growth vitamin. When we learn further how to destroy the former while leaving the latter intact no one will need to face the experimental difficulties earlier discussed.

Whatever may prove to be the actual nature of the mechanism whereby an organic factor in food promotes the deposition of lime salts in the body—for in some sense the specific substance under discussion most certainly exerts such an influence—it is clear that for proper calcification there must be in the food a sufficiency of lime itself. Moreover, since in the bones lime is present as phosphate, there must also be for proper bone formation a sufficient supply of phosphoric acid. A great deal of experimental work, old and new, has been done to elucidate the effect of reducing the supply of these constituents to below the minimum, or below the optimum. An actual deficiency of the kind can scarcely occur in practice however. The results do not concern us except in so far as variations in these inorganic constituents elucidate the influence of the vitamin factor. Interesting work, however, has been done by the school of McCollum which has such a bearing. It has been shown, for instance, that rickets occurs on a diet which is adequate in respect of lime, but, while deficient in phosphoric acid, is also deficient in the antirachitic vitamin. Further, a diet adequate in respect of phosphoric acid, but deficient in lime and the organic factor, will produce rickets. This work has also established in an interesting way the necessity, for the prevention of rickets, of a proper proportion between the calcium and the phosphorus in the food. What is of chief importance to the present discussion, however, is the evidence brought forward that a sufficiency of the vitamin is able, within limits, to correct a deficiency of calcium or of phosphates in the diet or a faulty balance of these two. If the deficiency in the inorganic constituents is large the amount of the organic factor required to ensure normal growth of the bones is found to be much in excess of that needed when calcium and phosphorus are supplied at the optimum. In the latter case a supply even of butter (which has but a low content of the antirachitic factor) will prevent symptoms; while in the former case cod-liver oil may prove necessary. Goldblatt, indeed, has found that with an adequate (though less than optimal) calcium supply butter in reasonable amount will secure normal calcification of the bones as fully as an optional quantity of cod-liver oil.

If anyone will survey and fairly appraise the literature of the last three years dealing with rickets as induced experimentally in animals, I do not think he can fail to admit that it strengthens Mellanby's original claim

that deficiency in an organic dietary factor closely associated with (but not necessarily identical with) the vitamin A plays an important part in the causation of rickets.

The further evidence which I would now like you especially to consider comes from the study not of animals but of children. Before dealing with this truly conclusive evidence I must, however, make brief reference to the remarkable studies which have demonstrated that radiant energy directly influences the processes of calcification in the body.

It is remarkable how long information with regard to the effect of light upon rickets has been in the literature without receiving general notice. As far back as 1890 Palm called attention to the fact that sunlight is very potent in preventing or curing the disease. Later, in 1912, Raczynsky showed that sunlight has a remarkable effect in promoting mineralization of the tissues generally. In 1919 Huldschinsky showed that precisely the same result can be got by the use of the radiations from a mercury-vapour quartz lamp, and demonstrated the actual healing of rachitic lesions in children under the influence of these radiations. Hess of New York has with his co-workers confirmed and extended these observations. They have, moreover, been extended to experiments on animals. McCollum and his colleagues have shown that in the case of rats the antirachitic effect of light is similar to that of cod-liver oil in correcting dietetic deficiencies. If, for instance, the diet lacks vitamin "X" exposure to sunlight, or to the mercury lamp radiations, will prevent the occurrence of rickets. On the other hand, as Hess, and later, Goldblatt and Soames, have shown, if the diet is satisfactory, and contains a sufficiency of the vitamin, rickets never develops, even when the animals are kept in the dark. It would seem, indeed, as though certain radiations and the influence of vitamin may each act vicariously for the other in regulating the mineral metabolism of the body. This is a truly remarkable relation. When we understand it we shall possibly know much more than we know now about the functions of vitamins. Now since a proper supply of sunlight is certainly a factor in hygiene, and a vitamin is no less a factor in diet, I think I was right in suggesting earlier in this lecture that the facts as now known should form a basis for an honourable peace between the two opposing schools of thought then mentioned.

In extending, however, the study of radiation from rickets to the more fundamental phenomenon of growth itself, Miss Margaret Hume has discovered facts which show that light may, after all, not act vicariously for the vitamin nor (as has been suggested) bring about a photosynthesis of that factor in the body. Rather does it render more mobile the residual stores of the vitamin already in the tissues. When the vitamin is absent from the food exposure to suitable radiations will maintain growth for a period, but not, it should be noted, indefinitely. Miss Hume concludes from her work that (in relation with growth at least) light can neither create nor be substituted for the vitamin; it appears to act as an economizer or activator of the stores so that a deficiency in the supply is less readily felt. When, however, the stores are exhausted the animal fails.

The briefest reference only can be made to another and most fascinating aspect of this subject. In quite another connexion it had been shown by Kestner that exposure to air previously irradiated may have the same effect upon an animal as direct exposure to the radiation itself. Acting upon a hint from Professor Hans Meyer, Miss Hume determined to test whether this would prove to be the case in connexion with her own studies. She found that as a matter of fact rats fed upon a diet deficient in vitamin A, when kept in glass jars containing air which had been exposed to the mercury-vapour quartz lamp for ten minutes every second day, showed definite prolongation of normal growth when compared with control animals not so treated. Miss Hume's work was mainly done in Vienna as part of the enterprise to which I would now direct your special attention.

Most of you will doubtless realize that I allude to the studies carried out in Professor Pirquet's clinic by Drs. Chick, Dalyell, and Mackey, Miss Henderson Smith and Miss Hume. These five women workers went to Vienna under the combined auspices of the Medical Research Council and the Lister Institute. They submitted themselves to three years' exile in order that studies might be made where material was abundant and conditions ideal. The conditions were indeed ideal, and all who read the Medical Research Council's report which deals with the enterprise will admit that the final results were proportionally clear and unequivocal. The intention underlying the enterprise was to study the effect upon the prevention and cure of rickets in children of diets poor or rich respectively in those fats which contain vitamins. The organization of Pirquet's clinic was such as to convert this comparison into an experiment perfectly controlled. It was an experiment wholly justified because the control diet, relatively deficient in the vitamin, was one which all the infants would have received but for the arrival of the British workers. It was a diet, too, of which the details had been carefully worked out by Professor Pirquet himself, than whom there is no higher authority on such matters. Before the observations under review were made he fully believed in its efficiency, the belief being based in the main upon its adequacy in respect of calories. The experiment gained greatly in accuracy because advantage was taken of the remarkable organization for the quantitative feeding of children which Professor Pirquet has established, and because all factors of faulty hygiene could be completely eliminated. The accommodation available permitted observations to be made upon sixty infants at any one time. The methods used for diagnosis must, I think, satisfy the most critical. Fortunately the work of the latest year was done with full knowledge of what had been discovered elsewhere concerning the influence of sunlight and irradiation. This factor was therefore controlled and separately studied. I cannot, unhappily, stop to put the details of the results before you. It seems enough to quote from the statement with which Professor Pirquet has prefaced the Medical Research Council's report.

"When Dr. Chick and her colleagues on behalf of the Medical Research Council and the Lister Institute began their work in my Klinik in 1919," he writes, "I had little expectation that it would lead to results of much practical value. At that time I was of the opinion that a vitamin deficiency in our ordinary diet was a very exceptional occurrence, as, for example, in case of infantile scurvy (Möller-Barlow disease). With regard to the etiology of rickets I held the view that it was an infectious disease, widely prevalent in this part of Europe, producing severe symptoms only in case of those children who possessed special susceptibility as the result of an inherited tendency, of a faulty diet, or of defective general hygiene. I imagined rickets to be a disease comparable to some extent with tuberculosis."

Professor Pirquet was indeed a critic not easily convinced, but later in his preface he states:

"The crucial experiment was thus successfully made. The British workers succeeded with the accuracy of a laboratory experiment, in a city where rickets is extremely prevalent, in maintaining a large number of artificially-fed babies free from the disease, and further, in the same wards, were invariably successful in healing children admitted with rickets already developed.

"With this the chain of evidence appears to me to be complete that animal experiments upon rickets are applicable to man, that rickets is a disease of nutrition, and that deficiency of fat-soluble vitamins in diet is an essential cause of the disease."

Thus is Edward Mellanby's pioneer work confirmed and his conclusions justified.

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THE REGULATING AND REFLEX PROCESS.*

BY

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PART IV.—NERVE CENTRES: THEIR CONSTITUTION AND SIGNIFICANCE.

THE term "nerve centre" is applied to a collection of nerve cells in the central nervous system which are associated together in the performance of some particular function. The term is a very elastic one and is used to denote a number of different conceptions. Its very elasticity makes its use convenient, but the term lacks precision and is apt to obscure the conditions which really exist. The nerve cell is only a part of the neurone, and its axis cylinder, its more important element in conducting the nerve impulse, may extend to great distances from the cell body. The term ascribes to the cell body of the neurone an importance which the facts do not warrant.

A collection of nerve cells—the cytons or cell bodies of the neurones, which give origin to an efferent nerve—is known anatomically as the nucleus of the nerve. It may also be termed an efferent nerve centre, and the neurones of which it is composed carry nerve impulses from the central nervous system to the rest of the body. The anatomical nucleus of the afferent nerve presents an important difference. It also lies in the central nervous system, but its cytons do not give origin to the peripheral afferent neurones, and are always separated from the latter by synapses. The cells of origin of the afferent neurones are found in the ganglia of the posterior nerve roots of the spinal cord and in the corresponding cranial ganglia. The impulses they receive at the periphery are carried into synapses before they reach the neurones of the afferent centre, and are therefore liable to all those influences which the synapse is capable of exercising.

The efferent neurones not only innervate certain structures in the periphery but also exert some kind of nutritive influence over them. If they supply voluntary muscle, that muscle fails to develop properly if the efferent neurone does not also develop, and injury to the neurone or centre leads to secondary changes in the muscle of a retrogressive nature. The afferent centre, on the other hand, is separated from the peripheral afferent neurone by an irreciprocal synapse, and is therefore unable to exercise any control over the peripheral neurone. Injury to the afferent centre may leave the peripheral neurone intact and able to maintain the nutritive functions it possesses by its axon reflexes.

Anatomically, therefore, there may be an afferent or receiving centre and an efferent or distributing centre in a reflex arc. But the reflex does not necessarily require either of them, the axon reflex being an example. In other cases there may be no afferent centre. There is evidence that in a deep tendon reflex, such as the knee-jerk, the afferent nerve impulse is conveyed directly to the peripheral efferent neurone, and there is only one synapse in the reflex arc. In the majority of reflex arcs more than two neurones are concerned, and consequently there is more than one synapse in the chain. An example of a nerve centre in which there are many neurones concerned is furnished by the cerebellum. The cerebellum is essentially an afferent centre which receives nerve impulses from proprioceptors in the body. The nerve impulses have passed through at least one synapse before reaching the cerebellum, a fact of very great importance, because opportunity is thereby afforded for the spread of the impulse to other pathways, with the resulting production of pain and other phenomena. The afferent centre in the cerebellum is in turn able to excite efferent neurones, the cells of Purkinje, which distribute the impulses to efferent neurones in other parts of the nervous system. The reflex through the cerebellar arc is therefore an example of one in which there are a number of neurones and synapses concerned. Reflexes through the cerebrum appear to be carried over even more complex arcs, and the possibilities of spread of the nerve impulse, and of its inhibition or diversion into other pathways, is correspondingly greater.

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CONSTITUTION OF NERVE CENTRES.

Physiologists employ the term "nerve centre" to denote collections of nerve cells in the central nervous system which are associated with the co-ordination of some definite physiological function. The anatomical units of which they are constituted are not always definitely located, and in some cases the centres are assumed to be present in certain positions although their very existence may be hypothetical. The heat-regulating centre is said to exist in the corpus striatum, and to control the nervous processes which regulate the production and loss of heat by the body. The centre is supposed to be directly influenced by the temperature of the blood in the blood vessels in its vicinity. If such action does occur it is unlikely that the body of the nerve cell in the centre is the site of stimulation by the change of temperature. It is possible that there are in it special receptors which are stimulated by changes in temperature, but far more likely that the synapses are the parts affected. To say that the centre is controlled by the temperature of the blood circulating through it is no explanation of where and how the action takes place. Variations in the resistances of the synapses in the centre as the result of changes in temperature afford a working explanation.

The same ambiguity attaches itself to other centres which are supposed to be the sites of a direct action by outside agencies. The respiratory centre is in some way influenced by the concentration of the hydrogen ion in its vicinity. The part stimulated by the hydrogen ion may be, as implied by Haldane, special receptors in the dendrons of cells in the centre, but it appears to us to be more likely that the hydrogen ion affects the resistance of the synapses in such a way that the afferent impulses are differently distributed and thus lead to alterations in the nerve impulses which leave the centre along the efferent neurones. The respiratory centre is generally considered to possess the power of automatism and to be the site of rhythmical discharges of nerve impulses. This automatism, if ever present, disappears during the condition of apnoea induced by the artificial diminution of the hydrogen ion concentration of the blood. It is never stated in what part of the respiratory centre the power of automatism resides. When one attempts to analyse the respiratory centre many difficulties are met with. The centre has been roughly located by physiological experiments in an area in the medulla oblongata in the neighbourhood of the afferent nucleus of the vagus nerve. Afferent nerve impulses are carried to it by the pulmonary branches of the vagus and give rise to the Hering-Breuer reflex. Afferent nerve impulses are also carried to it from numerous other sources, but whether they all go to the afferent nucleus of the vagus or to other neurones on the efferent side is unknown. The position, too, of the special receptors, if such exist, is not known. The synapses on the afferent side of the centre must be capable of alternation between excitation and inhibition, and of varying degrees of resistance to the passage of nerve impulses.

Provision is made for reciprocal innervation. The afferent impulses, whether from the pulmonary fibres of the vagus or from the afferent fibres of the nerves supplying the muscles of respiration, must inhibit certain neurones and excite others so as to bring about a proper co-ordination of the efferent nerve impulses to the muscles of inspiration and expiration respectively. The terminal efferent neurones leave the central nervous system at various levels according to the muscles they supply, and their cells of origin are found at considerable distances from the actual centre. The centre is also similarly controlled by nerve

impulses from the higher levels. The incoming nerve impulse may cause inhibition of expiration and excitation of inspiration or the reverse. In the case of some afferent impulses their action may be directed solely to the production of inspiration or expiration. The application of cold to the skin brings about inspiration, while stimulation of the mucous membrane of the larynx excites a violent expiration with the other movements associated with coughing.

The passage of the nerve impulses through the centre may be varied in a number of ways. They may be directed into the efferent inspiratory and expiratory neurones alternately for different periods of time. If alternating rapidly the movements of respiration are quick. If alternating slowly the respirations are slow. The depth of the respirations probably depends upon the number of neurones concerned as well as upon the rhythm. It is possible that we have constant variations going on in the neurones affected during quiet respiration, first one set and then another coming into action, fluctuation taking place just as it has been shown to occur in the capillary circulation. When the stimulus to respiration is powerful the impulses spread very widely over the efferent neurones, but alternate between inspiration and expiration. The number of neurones concerned in respiration is very variable. Even in quiet respiration the neurones affected are spread over a wide area, but in dyspnoea practically all parts of the lower level of the central nervous system are concerned on the efferent side. The nerve impulses seem, however, to come from the centre in the medulla oblongata and to be distributed from it to the efferent neurones.

If automatism is claimed for the centre it is difficult to see where this property is to be located. It cannot be in the efferent neurones, for the centre of the phrenic nerve shows no sign of it when isolated. If in the afferent nucleus of the vagus nerve, it is difficult to see how respiration is made to alternate between inspiration and expiration and is at the same time subject to control by other incoming nerve impulses. It is much simpler to regard the neurones as having the same property as other neurones elsewhere, and as responding only to nerve impulses coming to them from other neurones. The centre is affected in disease. Its activity is increased in febrile conditions, and Haldane has shown that fatigue of the centre results in rapid shallow breathing. It is unlikely that fatigue or the toxins of disease act primarily upon the cell bodies of the neurones; they are far more likely to bring about their results by action upon the synapses on the nerve pathways in the centre. In the rapid shallow breathing of fatigue the blood may be imperfectly aerated, yet the stimulus of the hydrogen ion content is ineffective and does not bring about a sufficient depth of respiratory movement to ventilate the lungs. The special receptor, if it exists, might be the site of the fatigue, but fatigue of the centre may be caused by breathing against a resistance, and in such case there is nothing to fatigue the special receptors. The evidence seems clearly to be in favour of a synapse fatigue.

More is probably known about the respiratory centre than about any of the others, but our knowledge of it is far from satisfactory. The vasomotor centre is another of the vital centres which presents similar problems. Unlike the respiratory centre it is unaffected by voluntary influence but is subject to changes by the nerve impulses underlying emotional states. It is also supposed to be directly influenced by conditions of the blood. Here again such influence is better explained by changes in resistance of the synapses than by the postulation of special receptors in the centre.

Drugs are often stated to exert their influence by direct action upon certain centres. Apomorphine is said to stimulate the vomiting centre. If it does have a direct action upon the centre the site of its action is most probably upon the synapses and not upon the neurones or special receptors.

If we are to regard the neurone as a conducting mechanism and not as an automatic generator of nerve impulses, the nerve centre may be looked upon as a network of nerve pathways which are so arranged as to conduct the nerve impulses in definite channels for the sake of obtaining a co-ordinated end-result. Certain pathways are, as it were, canalized in the centre, and incoming nerve impulses are directed and distributed to the efferent neurones. The controlling influence in the nerve centre is not the nerve cell but the synapses. We prefer to define the nerve centre as a collection of nerve pathways or neurones which are so arranged that nerve impulses coming into them are co-ordinated and distributed to bring about a definite end-result. The co-ordination and distribution effected in the centre depend upon changes in the synapses. The synapse is the all-important factor in the centre, and is the probable site of the action of fatigue and of other extraneous influences.

Formation of Pathways or Centres.

Some pathways or centres are preformed in the embryo. Their anatomical arrangement is such that afferent impulses coming into them bring about a definite end-result which is not the product of education. The vital reflexes of the body are examples. Most of these, such as the respiratory, cardiac, and vasomotor reflexes, remain during the whole of life. The sucking reflex of the newly born child is an example of one in which the centre is preformed but does not persist. Other centres are educated, and we have seen that the process of education consists largely in the cultivation of the synapses so that nerve impulses pass readily over some and not over others.

An interesting and important development of the postural reflexes takes place after birth in the child, and the pathways of the nerve impulses concerned are slowly educated. The attitude of the child, or its postural position *in utero*, is one of flexion. In the newly born child the muscles which produce flexion at a joint are more developed than are the opposing muscles. After birth an erect posture, or one of extension, is gradually assumed, and a long time elapses before the extensor muscles attain the relatively greater strength which characterizes them in the adult. With the development of new reflex paths the extensor muscles gradually assume a predominance. Failure to develop the new postural reflexes is a matter of considerable clinical importance, and, according to Blundell Bankart, is the real cause of the deformities which so commonly appear in the lower extremities and spine. Talipes, lateral curvature, and other deformities are explainable by the failure of the nervous system to lay down the particular pathways or centres which are requisite for the proper development of the muscles.

The response of the plantar reflex in the child differs from that in later life, and the explanation is probably to be found in the difference in development of the nerve pathways for the flexor and extensor muscles at the ankle-joint.

In the case of all reflexes which are in constant action there must be some provision against fatigue. This is probably effected by there being a sufficient number of pathways in the centre to allow of fluctuation. We may assume that the units in action are constantly changing within certain limits. When all are called into action simultaneously greater effects are produced and fatigue is more readily caused. An increase in the number of pathways concerned in a reflex may lead to greater spread in the central nervous system, but it is probable that some other factor is necessary such as the increased frequency of the impulses carried. The increased frequency may be the main factor in overcoming the resistance of other synapses and so causing spread beyond the usual channels. We know that the impulses do spread widely under certain conditions, and the spreading may be the result of a massive action of afferent impulses, or of a lessened resistance of the synapses as is induced by the action of strychnine.

Reflex pathways or centres which are preformed and persistent are concerned in the production of the unconditioned reflex. Such reflexes take place with a considerable degree of certainty although they are not altogether independent

and can be more or less influenced by nerve impulses from higher levels, especially by those which are concerned in emotional states.

Other centres, or pathways, are formed by education, and this is particularly the case in those reflexes which take place through the cerebral cortex. Such reflexes are "conditioned," and are therefore liable to various alterations and especially to inhibition.

Functional centres or pathways may be formed in abnormal states. Fixed ideas probably result from the establishment of certain pathways in the cortex of the cerebrum. In asthma afferent nerve impulses resulting from certain stimuli produce a reflex contraction of the bronchial muscle and a narrowing of the bronchioles. The reflex may become a "conditioned" one, and be induced by any afferent impulse resulting from a stimulus which has been associated with its occurrence. The pathways in time are so "grooved" that the reflex takes place very readily, and is excited by any afferent nerve impulse which has previously been associated with the asthma.

The phenomenon of pain, and especially of visceral pain, may be influenced in the same way. The frequent carriage of nerve impulses from the heart along the pain paths results in a lessened resistance of the synapses along the pathways taken. The occurrence of pain is facilitated, and a condition of status anginosus may be set up in which afferent impulses from other sources may spread into the same paths and produce pain. An attack of angina may be induced in this condition by a carious tooth or other source of pain.

In the production of visceral pain the afferent impulses from the organ affected spread into the pain paths in the lower level of the central nervous system, but the sensation of pain is located in some part of the body wall which is supplied with afferent nerves the impulses in which are capable of exciting a more or less localized sensation. In the areas supplied by these nerves various phenomena occur. Hyperaesthesia is sometimes met with, and the margins of the hyperaesthetic area are constantly varying in position. The hyperaesthesia is probably due to a decreased resistance of the synapses leading to the pain pathways, so that nerve impulses which would not ordinarily cause pain now do so because they pass more readily into the pain pathways.

The fluctuation in the extent of the area affected may be due to variations in resistance of the synapses in the pathways of the afferent neurones coming from the borders of the area, and be ascribable to the phenomenon of fluctuation or variation in the actual units employed in carrying the nerve impulses.

But other changes than sensory are usually found. Increased tone, or the actual contraction of muscle, often occurs in the body wall. The rigidity of muscle, especially well seen in the abdominal wall as the result of irritation of an abdominal viscus, is a reflex phenomenon, and is subject to the same variations as that affecting the sensory changes. A temporary centre is created in the central nervous system, and afferent impulses from the irritated viscus make use of certain pathways with the production of a number of end-results. If the afferent impulses are sufficiently numerous, or if there is any condition present which decreases the resistance of the synapses, the impulses may spread and occasion not only pain, hyperaesthesia, and contraction of muscle in a definite area, but vomiting, cardiac, vasomotor, and other reflexes.

Sensation and reflex action are closely bound up together. Even visceral reflexes may be productive of sensation. Alterations in the heart beat, palpitation, respiratory disturbances, vaso-constriction, and vaso-dilatation give rise to subjective phenomena. Irritability, exhaustion, and depression are of common occurrence in ill health. The fatigue of a synapse renders that synapse more resistant to the passage of a nerve impulse, and fatigue of the afferent pathways should be a negation. But fatigue and the sensations met with in ill health are positive sensations and not mere negations. They are, as a rule, general and not localized to any particular part. Their cause is unknown, but must be sought for in some alteration in the afferent nerve impulses affecting the conscious state.

REPORT OF THREE AUTOPSIES FOLLOWING CARBON TETRACHLORIDE TREATMENT.

BY

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WITH the object of confirming the report that carbon tetrachloride may produce pathological lesions of the liver,* a number of condemned prisoners were treated with small doses of the drug. *Post-mortem* examinations were made on three of the prisoners. In two cases the intestines were removed in three sections after double ligatures had been applied; the sections were opened and washed separately to determine the number of free and attached parasites in each.

Each prisoner received 4 c.cm. of carbon tetrachloride, followed in two hours by 2 oz. of saturated Epsom salt solution. No food was allowed previous to treatment except in the case of No. 8925, who by mistake received his ordinary breakfast at 6 a.m., and was treated at 10 instead of 8 in order to permit the passage of the food into the intestines. One and a half hours after the administration of the salts they were allowed tiffin.

Prisoner 8925 received 4 c.cm. carbon tetrachloride at 10 a.m. on February 21st, the salts at noon, and had tiffin at 1.30 p.m. The number of worms counted in the first twenty-four hours was: hookworms 101 (male 38, female 63), ascaris 1, oxyuris over 1,000. In the second and third periods of twenty-four hours no worms were found. The man was executed on February 24th. In the contents of the large intestine two oxyuris and two trichuris were found, and attached to its walls nine trichuris and twelve oxyuris. In the lower two-thirds of the small intestine three ascaris were found in the contents and one ascaris and one trichuris attached. Two ascaris were attached to the duodenum and upper third of the small intestine. Prisoner 8937 received 4 c.cm. carbon tetrachloride at 8 a.m., the salts at 10 a.m., and had tiffin at 11.30. During the first twenty-four hours one hookworm (female) was found and one oxyuris. In the second and third periods of twenty-four hours no worms were found; he was executed on February 24th at 8 a.m. In the contents of the large intestine eight hookworms (six male and two female) were found and two trichuris. Three other trichuris were attached to the walls. In the contents of the lower two-thirds of the small intestine one ascaris was found, and two trichuris attached to the wall; no worms were found in the duodenum and upper third of the small intestine. Another prisoner 8992, received 4 c.cm. of carbon tetrachloride, but in his case the worms were not counted, nor were the intestines examined. None of the patients made any complaint.

Sections of the organs were stained with osmic acid according to the method of Marchi. Sections also were stained by haemotoxin and eosin.

No. 8925.—The liver showed fatty degeneration, many of the cells containing fat globules; the largest of the globules measured about 10 microns. The kidney cells contained a few globules of fat. The spleen was greatly enlarged and showed pigment and fibrotic changes due to numerous attacks of malaria.

No. 8937.—The liver showed slight fatty degeneration, the kidney no recognizable changes.

No. 8992 showed no changes in liver or kidney.

Conclusions.

1. A dose of 4 c.cm. of carbon tetrachloride given as in the above cases may produce fatty degeneration of the liver.

2. Although numerous fat globules may appear in the liver cells apparently as a result of the administration of carbon tetrachloride, the changes in the liver are of a temporary nature and do not appear to contraindicate the use of the drug, because many patients have been treated with much larger doses and have not complained of any discomfort other than very slight giddiness, nor have symptoms or signs of ill health arisen in them. Further, many hundreds of school children have received doses of carbon tetrachloride, and in no case has any sign of ill health occurred subsequent to treatment.

3. In case No. 8925 the changes in the liver were so marked that we would have expected signs of marked ill health during life, but these were absent; consequently it appears that much fat (presumably derived from fatty degeneration) may appear in the liver and yet be a matter of small importance as concerns the health of the patient.

* Docherty, J. F., and Burgess, E.: Action of Carbon Tetrachloride on the Liver, BRITISH MEDICAL JOURNAL, November 11th, 1922, p. 907.

British Medical Association.

PROCEEDINGS OF SECTIONS AT THE ANNUAL MEETING, 1923.

SECTION OF PUBLIC HEALTH.

A. MEARNS FRASER, M.D., D.P.H., President.

DISCUSSION ON FACTORS CONTRIBUTING TO THE RECENT DECREASE IN INFANTILE MORTALITY:

Are such Factors likely to be Permanent or Temporary?

OPENING PAPER

BY

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IN introducing this discussion I must apologize for the incompleteness of my paper, but I hope this will be remedied by subsequent contributions to the discussion. The subject is a large and complicated one and worthy of very careful research. It seems to me that the best plan is to set down the indisputable facts that appear to be relevant and afterwards to state various deductions and opinions. These facts may be well known to most of you, but nevertheless it is necessary to state them.

For most of my facts I am indebted to the excellent reports of the Registrar-General, for which Dr. Stevenson is presumably still responsible, although his name no longer appears in the reports. I am also greatly indebted to the medical officers of health of the large towns and counties, who have very kindly supplied me with facts and opinions relating to the decrease of mortality in their areas, and to Dr. A. D. Symons, one of my assistant medical officers.

The statistics here given relate not only to the fall in the infantile mortality in the country as a whole and in relation to areas, quarters of the year, and causes of death, but also to the smallness of this mortality under certain conditions. These latter figures throw considerable light upon the probable causes of the fall.

TABLE I.—*England and Wales: Birth Rates, Death Rates, and Infant Mortality Rates.*

Years.	Birth Rate.	Death Rate.	Infant Mortality.	Increase or Decrease.	
1841-1850	32.6	21.6	153		
1851-1860	34.1	21.2	154	+ 0.6	
1861-1870	35.2	21.3	151	0.0	Education Act, 1870.
1871-1880	35.4	21.3	149	− 3.2	Public Health Act, 1875.
1881-1885	33.5	18.7	139	− 6.7	
1886-1890	31.4	18.5	145	+ 4.1	
1891-1895	30.5	18.5	151	+ 3.9	Housing of the Working Classes Act, 1890.
1896-1900	29.3	17.6	156	+ 3.2	
1901-1905	28.2	16.0	138	−11.5	Midwives Act, 1902.
1906-1910	25.3	14.4	117	−15.2	Education Act, 1907; Notification of Births Act, 1907; Children Act, 1908.
1911-1915	23.6	13.8	110	− 5.9	National Insurance Act and Tuberculosis Order, 1911; Notification of Births (Extension) Act, 1915.
1916-1920	20.1	13.7	90	−18.1	V.D. Regulations, 1916; Maternity and Child Welfare Act, 1918.
1921	22.4	12.1	83		
1922	20.6	12.9	77	−11.0	

It is apparent that there was no fall whatever in the infantile mortality between the years 1841 and 1900, and that since then the fall has been large and continuous. The fall in the birth rate commenced twenty years before the fall in the infant death rate and during this period it fell 17 per cent.

The fall in the general death rate had been almost continuous, although comparatively small in amount (19 per cent.), for the sixty years previous to the fall in infantile mortality. If the period of 1840 to 1920 be divided into two periods of forty years, the first period shows a reduction of the general death rate of 6 per cent. and the second of 30 per cent. The second period practically begins with the passing of the 1875 Act. We have, then, a fall both in birth rate and death rate up to 1900 without any fall in the infant death rate. We must either accept that the fall in the birth rate and the conditions causing the fall in the death rate—presumably improved sanitary conditions—had no effect on infantile mortality, or that whatever effect they might have had was neutralized by some other adverse circumstances. As I shall point out later on, I think adverse circumstances did exist and were a condition of increased material prosperity without a corresponding improvement in education and conduct—a condition, in my opinion, particularly adverse to infant life.

The next important point arising out of this table is that the fall commenced long before the passing of the Notification of Births Act, the Maternity and Child Welfare Act, the Education (Administrative Provisions) Act, the Children Act, and the Midwives Act, and before any considerable direct efforts to reduce infant mortality. The fall did not commence until twenty-five years after the Public Health Act, 1875, with its sanitary service, so that this Act alone appears to have had little influence. The Education Act, 1870, would hardly be likely to produce any considerable influence upon infant mortality for about a generation, or, say, thirty years, taking into consideration the gradual development of the work and the fact that it could only become operative as the school children became parents. This would bring us to 1900. As many of the facts to be set out seem to show that the decrease of infantile mortality is due to a general raising of the intelligence of parents, it is of interest to see that the commencement of the decline of mortality corresponds fairly well in point of time with the improvement of the general education of the people.

The following table has been compiled from the replies received from the medical officers of health of the towns and counties.

TABLE II.—*Fall in Infant Mortality in Certain Towns and Counties grouped according to Date of Commencement of Infant Welfare Work.*

Group and Date when Health Visiting Commenced.	Decrease in Five-year Periods stated as a Percentage of Period immediately preceding.					
	1896 to 1900.	1901 to 1905.	1906 to 1910.	1911 to 1915.	1916 to 1920.	1921 to 1922.
I. Between 1900 and 1905 (13 towns)	+4.4	−13.9	−14.2	−6.8	−16.9	−12.5
II. Between 1906 and 1910 (9 towns)	0.0	−13.3	−16.0	−6.3	−13.6	−12.1
III. Between 1912 and 1913 (6 towns)	−1.8	−15.0	−19.0	−6.1	−12.9	−17.0
IV. Between 1914 and 1916 (22 counties)		−12.7	−10.3	−9.5	−15.8	−11.3
V. Between 1917 and 1920 (10 counties)		−15.2	−17.9	−8.9	−14.1	−12.7

In Groups I and II the health visiting was not complete for considerable periods averaging 7 to 14 years.
In Group III the health visiting was complete in periods averaging from 3 to 7 years.
In Group IV the health visiting was complete in 2 to 3 years afterwards.
In Group V the health visiting was complete in 2 years afterwards.

The grouping of these towns and counties is probably not by any means satisfactory, as the commencement of health visiting may mean very different things in different localities. The health visiting may rapidly develop into a satisfactory scheme or it may drag on as a very ineffective service for many years. Still, broadly speaking, the groups of towns and counties do represent those that commenced child welfare work early and those that commenced at later periods.

Examination of the table does not show any influence of this early or late commencement of child welfare activities, nor does it reveal any material difference in the

decrease of mortality in towns and counties, although the schemes came into operation much later in the counties.

The following table (III) seems to point in the same direction, for although the principal and the earliest activities have been in the county boroughs, the decrease of mortality in these has only been slightly greater than in the rural districts. It is quite likely, however, that with equal efforts at teaching more effect can be produced in rural than in urban districts, owing to greater possibilities of carrying out the advice given.

TABLE III.—*Comparison of Infant Mortality for 1911–13 with 1920–21 in County Boroughs and Urban and Rural Districts.*

	County Boroughs.			Other Urban Districts.			Rural Districts.		
	N.	M.	S.	N.	M.	S.	N.	M.	S.
1911-13	132	126	98	124	100	86	112	84	74
1920-21	101	82	67	94	70	59	87	63	52
Decrease per cent.	23.5	35.0	32.0	24.0	30.0	31.0	22.3	25.0	30.0
	27.0			27.5			25.3		

N. = North. M. = Midland. S. = South.

The decrease of mortality in the four quarters of the year is of considerable interest.

TABLE IV.—*Fall of Infant Mortality in Quarters of the Year.*

	Period.		Percentage Decrease.	Percentage Decrease of 1921–22 on 1911–15.
	1911–15.	1916–20.		
First quarter	119.3	116.7	2.2	17.4
Second quarter	91.0	81.0	7.7	17.6
Third quarter	120.1	75.5	37.1	42.5
Fourth quarter	104.3	90.3	13.4	25.2

The Registrar-General points out that the decrease in the previous ten years was much more evenly distributed throughout the year, and this was so for the years 1921 and 1922.

Tables III and IV both point to warmth as being favourable to infant life and cold adverse, and they seem to show greater possibilities of diminishing mortality under favourable climatic conditions. In comparing the rural districts of the South with those of the North one must, however, remember that many of the so-called rural districts in the North are really semi-urban—being either mining or industrial. The excess of the mortality in the winter months compared with the summer months is much more marked if diarrhoea is excluded or during the years of slight prevalence of diarrhoea.

TABLE V.—*Decline of Infant Mortality under Different Causes of Death.*

Diseases.	1891 to 1900.	1901 to 1910.	1911 to 1915.	1916 to 1920.	1920 to 1921.	Percentage Difference between 1920-21 and 1891-1900.
Common infectious Diseases	10.03	8.09	7.42	5.08	3.91	61.0
Tuberculosis ...	7.85	5.17	3.03	2.00	1.50	80.4
Diarrhœa and enteritis	25.17	20.47	19.24	9.34	10.88	56.7
Bronchitis and pneumonia	13.06	10.68	9.60	9.30	8.04	38.4
Rickets	0.55	0.57	0.39	0.32		
Overlying	2.05	1.75	1.40	0.83	0.61	70.7
Convulsions	18.23*	14.14	8.81	6.79		

* Including teething.

All the great causes of death (Table V) except those closely associated with birth and ante-natal conditions have shown a remarkably steady and progressive decrease. The decrease of the years 1920-21 as compared with the period 1891-1900 is shown as a percentage and is very striking. These causes of death are essentially those that one would expect to be influenced by better feeding and general care.

A consideration of the conditions of living in the localities with a low infantile mortality and of the occupations with a low mortality should throw some light upon the essential causes of infant mortality. The lowest infantile mortality rates are found in the rural districts of the South of England and on the west coast of Ireland. Perhaps the points I wish to bring forward are best illustrated by the rates in the province of Connaught. The death rates in the counties of Connaught for 1920 were: Galway 53, Leitrim 41, Mayo 49, Roscommon 48, Sligo 57.

From my slight knowledge of this country I should state the conditions to be absence of industrialism, a warm, moist, sunny climate, very bad housing conditions, much time spent in the open air, no over-clothing, crude rural sanitation, comparative poverty, breast-feeding almost universal, food of mothers simple and fresh, education poor, both general and special.

Similar rates obtain throughout the whole country in the upper and middle classes. In 1911, a year of very high infantile mortality, the following were the death rates of legitimate children (the professions are those of the fathers): Artists 27, merchants 30, medical practitioners 39, naval officers 41, solicitors 41, army officers 44, clergymen 48.

Here the conditions are almost the reverse of the Irish counties—a very large proportion of the families living in the large towns, comparative affluence, artificial feeding more common, and good general education and intelligence.

It looks as if low mortalities are quite possible, on the one hand, with ignorance and poverty under good conditions of sun and weather and more primitive living—particularly natural feeding—and, on the other hand, even under town conditions where there is intelligence, care, and purchasable amenities. Poverty is probably rather a safeguard than otherwise in an ill-educated population, as it tends to decrease the amount of artificial feeding of the infants and drunkenness of parents—two great causes of infant mortality.

Analysis of Replies from Medical Officers of Health as to Causes of the Decrease of Mortality.

Analysing the replies from the medical officers of health of forty-four towns, I find that twenty-five give health visiting and child welfare, or better midwifery services, as the chief cause. Two give better education, four reduced birth rates, five improved sanitation and social conditions, two dried milk, and six are indefinite or refrain from making any statement.

Analysis of replies from forty counties shows that twenty-three give child welfare work as the chief cause, one ante-natal work, five general education, two improved standard of living, three improved sanitation, three horse traffic replaced by motor traffic, three cleaner milk, one the equable climate of late years, and one gives no reason.

The principal causes may now with advantage be considered separately.

General Education.

This has probably acted in two ways—(1) by improving the general intelligence and receptivity, and (2) by increasing the sense of responsibility and the value of life.

There can be no doubt that there has been a great development of the sense of responsibility of parents for the health and lives of their children, and this appears to me to be one of the great causes of the decline of infant mortality. It was the common attitude of the mass of the people thirty years ago that the health of the children was the concern of the parents only. This idea has practically disappeared, and it is almost universally recognized that the health of the children is also the concern of the State, and that the parents cannot be allowed to neglect it. It is often said that we have undermined the responsibility of parents by our social work, both education and public health. If this is examined it must be recognized that it is not the responsibility that has been lessened, but the irresponsible power of parents over their children. Until

recent years a parent could neglect or be cruel to his child to any extent if he only avoided death, with the resultant coroner's inquest.

This increased responsibility has no doubt been brought about by various causes. The Education Act of 1870 must have been the initial cause, but it has been increased very largely in recent years by a variety of social work, particularly under the child welfare schemes, the medical inspection of school children, and the Children Act. The war has probably also been a powerful educative factor.

The decrease of alcoholic intemperance which undoubtedly has taken place in recent years has probably contributed considerably to the fall in infantile mortality. This decrease, however, must be considered as one of the conditions brought about by general education. The greatly decreased number of convictions for drunkenness and the diminished consumption of alcohol may be taken as proofs of a decrease of this form of intemperance, and its effect upon infantile mortality is shown in one direction by the decrease in deaths from overlaying (from 2.05 in 1891-1900 to 0.60 in 1920-21).

It seems extremely probable that the major part of the fall in infantile mortality prior to 1911 was due to a general raising of intelligence and responsibility. Before 1911 special measures directed towards infant welfare could have had no appreciable influence, and for reasons given elsewhere the fall cannot be attributed largely to improvement of general sanitation, improved material conditions, or lessened birth rate. To what extent the fall since 1911 has been due to general education and to what extent to special education, it is difficult to say. It is something like the problem of the soil and the seed in the causation of infectious disease; without the preparation by general education the special teaching later on would probably have borne little fruit.

The low mortalities in the professional classes must, I think, be attributed to education and a higher standard of conduct rather than to material advantages, although the latter no doubt have contributed to the result.

Special Education in Everything Appertaining to Health.

Under this heading is included, first and by far the most important, the influence and teaching under the maternity and child welfare schemes, but it also includes the educational influence of medical inspection of school children, the tuberculosis scheme, the establishment of district nurses and trained midwives, and other educational influences.

Most of us must, I think, have come to the conclusion from a close knowledge of the facts that a considerable proportion of the fall in the last four or five years at least has been due to the various activities under the maternity and child welfare schemes, but it is most difficult to prove this by statistics. The decrease of 11.5 per cent. in 1901-5 and of 15.2 per cent. in 1906-10 must have been due principally to general conditions antecedent to child welfare, although even in these years the pioneer work of some of the towns may have had a general educational influence throughout the whole country in altering our ideas of the value of infant life.

The decrease in the period 1911-15 was slower, being only 5.9 per cent. It included, however, the very abnormal year of 1911 and the first seventeen months of the war. This period was followed by a decrease of 18.1 per cent. in the next five years and a further decrease of 11 per cent. for the two years 1921 and 1922. This very large fall of about 30 per cent. in seven years, following upon a fall of about 40 per cent. in the previous fifteen years, seems to point to some special cause operating during the later period. It was the period of greatest child welfare activity. Previous to it the schemes were limited to considerable centres of population and even in large towns they were very incompletely developed. The war was a large disturbing element, with its greatly decreased birth rate, increase of female employment, shortage of milk, and probably increase of natural feeding in consequence. Those who attribute the low infant mortality in the last three years of the war to low birth rates are faced with a rise of 25 per cent. in the birth rate and a fall of 15 per cent. in the infant mortality in 1920, 1921, and 1922, although it may be argued that the bad effects of a high birth rate are only felt after its continuance for a considerable period.

It must, however, be admitted that there are facts which are against the assumption that infant welfare work is the chief determining factor in the decrease. These facts have been discussed in connexion with Tables II and III. The great decrease of mortality in rural districts (almost equal to that of the towns), notwithstanding that the child welfare schemes are by no means so complete and comprehensive and were brought into operation much later, may be partly due to the educational work of district nursing, which has undergone great development. It is probable, too, that with an equal amount of education greater effects can be produced in rural districts, owing to the better opportunities of carrying out directions regarding fresh air and sunlight. The same reason may perhaps explain the much greater decrease in the South and Midlands compared with the North of England (Table III), although the North, having had a much higher initial rate, presented a greater scope for reduction. Probably the amount of time spent out in the open air rather than in a hot stagnant nook in the kitchen is a most important factor in influencing not only the general health of the infant but also in reducing a disease like summer diarrhoea, which is perhaps too much regarded solely from the point of view of food infection.

The fact that the decrease of infant mortality since 1911 has been mostly confined to the third quarter of the year, while that prior to 1911 was fairly evenly distributed throughout the year, appears to indicate new causes for the later period. I think the nature of the fall, particularly the fall in infantile diarrhoea, fits in very well with the supposition that the new causes at work are the child welfare activities.

Fall in Birth Rate.

This has been discussed and reasons have been given for thinking that it is only a minor contributing factor.

Improved Standard of Living.

The evidence goes, I think, to show that improvement in wages without improvement in education and standards of conduct, results on the whole in more drunkenness, a greater carelessness, lessened natural feeding of infants, and a consequent increase in infantile mortality. Certainly the low mortality of 1921 and 1922 corresponded with much unemployment and low wages, judged by purchasing power.

Dr. Findlay, in his report on the causes of infant mortality to the Medical Research Committee, says:

> "The unlikelihood of the wage element being a factor of any moment is supported by the fact that in times of famine and industrial trouble the infantile death rate usually falls. For example, during the year 1912 the number of people involved in disputes causing stoppage of work and the aggregate duration of working days lost was the highest on record, and yet, with the exception of 1916, the infantile mortality was the lowest ever recorded in most of the chief towns of Scotland and England."

The Registrar-General, in his report for the year 1911, says:

> "The mortality of miners' infants is disproportionately high, especially in view of the fairly high wages earned by these men. They are certainly much better paid, and consequently in a better position to provide for the welfare of their infants, than the unskilled and casual labourers of the towns who form the bulk of Class 5, while their wives are as a rule not compelled to assist in earning the family living, yet at each of the five age periods the mortality of their infants is higher than that of Class 5 with the single exception of the second, 1-3 months, where it is only a trifle lower."

Miners had the highest infantile mortality for the year 1911, of eight classes into which the Registrar-General divides the occupations. Miners, we know, are exceptional people, their housing is exceptional, and their wages have on the whole been higher than those of the working classes generally. The conditions under which they live vary greatly in different parts of the country, but speaking generally there is not a dense aggregation of houses over area. I think this must be accepted as an instance of wages being ahead of education and ideals.

Wages, estimated by their purchasing power, underwent a very marked and almost continuous increase from 18

to 1900. Wages so estimated in 1902 were almost three times as much as in 1840, more than twice as much as in 1860, and 50 per cent. more than in 1880. During this period there was no reduction in infantile mortality.

From 1900 to 1913 there was a slight decrease of the purchasing power of the wages accompanied by a very large decrease in the infantile mortality.

During the war there were very many disturbing factors. The years 1920, 1921, and 1922 had the three lowest mortalities on record—namely, 80, 82, and 77 respectively. In the year 1922 there was widespread unemployment and the purchasing power of employed persons was practically the same as in 1914. In 1920 the purchasing power was also about the same as in 1914. In 1921 the purchasing power of the wages was slightly in excess of 1914, but there was much unemployment due to the coal strike. In these three years, therefore, we have the three lowest mortalities on record with no increase in the purchasing power of the wages received, and much unemployment.

Improvement of General Sanitation.

This does not appear to have had any marked influence upon infant mortality. The period from 1880 to 1900 was one of marked activity in the improvement of drainage, housing, scavenging, street cleansing,, and water supplies, but although effect was produced on the general death rate there was no effect whatever on the infant mortality rate. Again, the period 1914 to the present time has been marked by an almost complete cessation of expenditure on sanitary schemes, a marked deterioration of housing, and, I think, a lessened efficiency generally of sanitary administration, yet during this period there has been a very marked diminution of infant mortality. Under this heading I do not include improvement of the condition of houses due to better conduct of the tenants. This is an extremely important matter, but it must be considered as one of the effects of education.

It is probable that Dr. Brend is correct in his contention that pollution of the atmosphere, particularly by smoke, is one of the great reasons for the excess of infant mortality in our large towns, but as there has been very little improvement in this respect it is consequently improbable that any considerable decrease in mortality can be explained in this way.

The removal of slum areas must, where conducted on a sufficiently large scale, be an important factor in the decrease of infant mortality, but the houses so dealt with are in most towns a very small proportion indeed of the total houses, and the proportion of children to adults in the worst slums is often very small compared with that in the ordinary working-class houses. It is probably for these reasons that the removal of slums has had little effect on the infant mortality rate of the country.

Clean Milk and Dried Milk.

The two must be grouped together as acting in the same way. It is doubtful whether there has been any sufficient improvement of the cleanliness of milk apart from that of the great distributing companies, which practically leave rural districts alone, to produce any considerable effect. Nor is the use of dried milk, although perhaps efficacious where used, sufficiently general to be a large factor in the decrease of mortality. The decrease of mortality in rural districts is certainly not due to an improved milk supply. The limitation of the improvement, since 1911, mostly to the third quarter of the year does, however, suggest that there has been a great reduction of infection through milk. Lessened contamination of milk in the homes must be looked upon as principally a result of education.

Lessened Horse Traffic and Tarred Roads.

The diminution of flies and dust consequent on these causes are probably contributory factors. We are rapidly forgetting the dreadful condition of our roads in summers previous to the use of tar. At a time of the year when house windows should have been wide open they were kept closed for fear of admitting clouds of dust, and the extreme dustiness of the roads must often have kept infants out-doors.

Ante-natal Causes.

In the face of the statistics showing the very small decrease of mortality under one month and the almost complete absence of decrease under one week, it cannot be contended that ante-natal work has produced much result on infant mortality so far. It is true that during the last few years there has been a decrease, and this may be a promise of better things in the future. In particular, systematic treatment of venereal disease in expectant mothers and the general prevention of venereal disease should contribute to the reduction of mortality at this early age.

Climatic Conditions.

The influence of climate on infant mortality is a matter of great interest, and might well be the subject of special research. I think it is obvious that climatic changes cannot be the main cause of the decrease since the beginning of the century, as it has been so prolonged and so steady; but considering the great influence of temperature, as shown by the death rate in the four quarters and the rates in the South and North, one would hesitate before declaring that the recent mild winters have not been a contributory factor. The years 1920, 1921, and 1922 were years of very low infantile mortality. Reference to the Registrar-General's reports shows that in London the air temperature of the winter months for 1920-21 averaged about 2½° above normal, but that in 1922 the normal was only very slightly exceeded.

The effect of a hot summer in causing big epidemics of infantile diarrhoea and almost determining the rate for the year is one of the best known facts relating to infant mortality. It is therefore of great interest that the hot dry summer of 1921 was not accompanied by any considerable prevalence. A minute comparison of the years 1911 and 1921 would be of great interest, 1911 being the last year with a really high death rate from diarrhoea.

A comparison of these two years as regards air temperature, earth temperature, and rainfall shows: (1) By the Greenwich records that the air temperature of 1911 exceeded that of 1921 in May by 4.4°, June 2.7°, July 5.5°, August 8.9°, September 1.7°, October −5.2°; by the Southport records that there was marked equality of air temperature in the two years, 1911 temperatures being in excess in August by 5.1° and less by 7.3° in October. (2) A remarkable equality of earth temperature at a depth of 4 ft. is recorded at Kew (Greenwich four-foot temperature not being available for 1911), the 1921 temperature being slightly in excess. (3) The rainfall for the six months May to October, 1911, was 11.74 inches, as compared with 8.95 inches in 1921. The rainfall in various months of the two years was —May, 1.37 and 1.57; June, 2.67 and 0.35; July, 0.53 and 0.98; August, 1.86 and 2.99; September, 2.15 and 1.37; October, 3.16 and 1.69. The four-foot earth thermometer rose to 56° in June, 1921, and remained above this temperature into the middle of October. There is nothing in these records to explain the remarkable difference in the diarrhoea mortality in the two years—namely, 1911, 36; 1921, 13.8; and there can be little doubt that twenty years ago the climatic conditions of 1921 would have produced a very high prevalence of diarrhoea. It has been suggested that the extraordinary freedom from infantile diarrhoea in 1921, considering the heat of the summer, was due to a comparative absence of flies. On this I have no evidence. On the whole, I think that the evidence is that the decrease in recent years has not been due largely to climatic conditions, and that the rapid decrease of diarrhoea and the comparatively small rise in the hot summer of 1921 are strong evidence of the great effect of recent child welfare work.

I have not been able to consider the question of occupation, as the trade figures for 1921 are not yet published.

The number of occupied women at the 1911 census was about 16 per cent. greater than at the 1901 census, and the number of occupied married women showed an increase of 19 per cent., so that the decrease of infant mortality was not associated with a decrease in the number of occupied women.

Summary of Conclusions.

My conclusions are that the fall of the infant mortality rate has been due chiefly to education. The earlier part of the fall was probably principally due to the operation of the Education Act of 1870, raising the intelligence of the people and gradually increasing the sense of responsibility of parents. The latter part of the fall was probably brought about by improvement of general education and by the special educational influence of the child welfare schemes, aided by the educational work of the tuberculosis and medical inspection schemes, the establishment of district nurses, etc., and other similar work.

How much of the later fall should be attributed to special and how much to general education it is impossible to say. There are probably many minor contributory factors—such as diminishing birth rate, cleaner milk, better medical, nursing, and midwifery services, diminished horse traffic, tarred roads, and improvement of sanitation.

In attributing such a large influence to education I do not wish to belittle such important matters as pollution of air with smoke, overcrowding, and bad housing; but I believe that these are only very specially potent when combined with ignorance and carelessness, and it is the combination of these conditions that has caused the very high rates of our industrial towns of the North. Every sanitary worker knows that the evil effects of a house grossly insanitary in construction and situation may be enormously reduced by scrupulous attention to all the details of good house management.

It is in education and creation of a sense of responsibility, and not in the material conditions, that so much improvement has taken place. Everything, I think, points to the improvement being permanent and progressive. The decrease since 1901, taken in five-year periods, has been large and uninterrupted. It has affected every type of district and every part of the country. Not only so, but the fall has been equally continuous in all the big groups of disease except those due to conditions before birth. If any considerable proportion of the fall could be attributed to climatic conditions, such as mild winters, or to periodicity of infectious disease, we might have real setbacks, but I consider the evidence is strongly against this. We shall, no doubt, have slight setbacks owing to conditions favourable to diarrhoea, and possibly to severe outbreaks of measles, whooping-cough, and influenza; but apart from these, in my opinion, the improvement will be progressive as long as education keeps ahead of material advancement. A sudden and very marked increase of prosperity without time for a corresponding advance in education and conduct is the only condition that would, in my opinion, produce any considerable increase in our infant mortality. This, however, is extremely improbable.

DISCUSSION.

Dr. Herbert Peck (M.O.H. Chesterfield R.D.C.) said that while he agreed with Dr. Wheatley on most points he thought the latter had underestimated the effect on infant mortality of the general improvement in sanitary conditions, especially the progressive elimination of privy middens and their conversion to the water-carriage system. He also believed the introduction of summer time had a beneficial effect on the general death rate, and especially the infant mortality rate, since it secured an additional hour of daylight if not of actual sunlight during a considerable portion of the year.

Dr. H. B. Brackenbury (London) considered that since it was known that a low infantile mortality might be found in selected localities or among selected classes in which the conditions varied in many respects, it was desirable to secure a record of the *variations* in infant mortality in such special classes or groups of circumstances. Such an investigation might throw valuable light on the question as to which factors were of the most practical importance in reducing the death rate. It seemed to be established that a dirty atmosphere had a considerable effect in increasing infantile mortality, but it was also evident that education was very powerful as an influence in this sphere. The general education begun in 1870 produced its effects, as would be expected, about thirty years later, and these effects had been continuous. Special education in personal and domestic hygiene had begun between 1901 and 1905, and we should see whether this produced a similar effect in the years immediately to come. The educational work of child welfare centres should, on the other hand, produce an immediate rather than a remote effect, and it was doubtful whether such an effect could be shown statistically. The beneficial effect of these centres—especially if conducted as educational and not as treatment centres—combined with home visiting on the comfort and well-being of many homes and children could not be doubted, but it was nevertheless permissible to be sceptical as to their permanent effect on infant mortality.

Dr. D. C. Kirkhope (M.O.H. Tottenham) agreed that education had had a powerful influence on the decrease of infant mortality, especially the education of mothers in their homes by the health visitor. In the poorest locality in Tottenham the introduction of a voluntary child welfare scheme had been followed by an immediate and marked reduction in the heavy infant mortality, and as the work extended the fall in the rate increased. The instruction given at the centres was also of great importance and the attendance there of mothers with their babies tended to create a friendly rivalry in connexion with the progress of the children which could not fail to have a marked effect.

Dr. Clark Trotter (M.O.H. Islington) contended that the value of the education given in the course of home visitation had been underestimated by some of the previous speakers. Unless the welfare centre were most intimately associated with home visiting it did not reach the right cases. Good wages did not necessarily imply the most judicious expenditure of the money. In one town the infant mortality had been almost halved during a year of severe trade depression. The children of those out of work and their mothers had been fed by voluntary agencies and the staff of health visitors increased. He did not agree that the decrease in mortality could be mainly due to the Education Act of 1870. The real education of the adult, he considered, was acquired after his school life. The publicity given to health matters in the press and the vast improvement in the conditions of the working classes generally were, in his opinion, the most important factors. A man out of work now was looked after in many ways and his children did not suffer as they did prior to 1870.

Dr. H. Scurfield (late M.O.H. Sheffield) found himself largely in agreement with Dr. Wheatley, but was inclined to attribute more importance to the factor of a safer milk supply in the form of dried milk. He quoted the late Dr. Ewart as having shown that a probable factor in the increased infant mortality in the last decade of the nineteenth century was increased contamination of the milk supply owing to the removal of the consumer further and further from the producer, and that the improvement in the mortality rate coincided with the extended use of dried milk. It had to be remembered that the use of dried milk affected not only the purity of the milk as distributed but limited the probabilities of pollution in homes with unsatisfactory means of storage. In making a comparison with the conditions in Connaught, Dr. Wheatley had omitted to mention freedom from venereal disease and the abuse of alcohol by mothers, both of which factors were stressed in the Irish Carnegie report. Again, one had to remember that the ideals of family life in Ireland had not been destroyed by the industrial revolution and the agricultural revolution which occurred in England in the reign of George III. It was probable that in such circumstances a religion which held up high ideals of motherhood had never lost its effect. The teaching of domestic hygiene in schools was generally regarded as important, but unfortunately it was expensive owing to the need for providing special centres. It was accordingly the first thing to go when the cry for economy in educational matters became insistent. With regard to the future he anticipated a reduction in neo-natal mortality when the new midwifery was established.

Dr. J. W. MILLER (C.M.O. Radnorshire) said that in comparing the infantile mortality in the City of Hereford with that in the agricultural county of Radnor, he had been struck by the smaller percentage of breast-fed children in the latter area. The figures were for Radnorshire 66 per cent. in 1922 and 62 per cent. in 1921, while in Hereford city in 1919 and 1920 it was over 80 per cent. The fact that the infant mortality was lower in Radnorshire was, he thought, accounted for by the fact that children in rural districts obtained more fresh air and sunshine. He considered the welfare centres were a valuable factor in hygienic education, but the visiting of the homes by health visitors was the most important element in improvement.

Dr. G. H. PEARCE (M.O.H. Batley) placed the causes of the reduced mortality among infants in the following order: improved education of mothers by health visitors in their homes, which had led to an increase in breast-feeding; the healthy rivalry established among mothers by attendance at welfare centres; the increased use of dried milk; the influence of maternity homes.

Dr. W. A. BULLOUGH (C.M.O. Essex) said that hereditary causes had probably an unfavourable influence on infantile mortality, since careless and ignorant mothers had often the largest families with a proportionate death rate. The mother herself constituted the environment of the infant, and everything in this connexion depended on her character and knowledge. The mother's knowledge depended on the general education provided by the national system and on the special education provided by the health visitor and the district midwives. He looked to the district nurse midwife, especially in rural areas, as the most potent factor in the advancement of public health knowledge, not only with respect to infant welfare but also tuberculosis and venereal diseases. He believed the chief factor in the recent fall in mortality rates was the reduction in the bacterial content of the infant's food, whether this was brought about by breast-feeding, certified milk, or dried milk.

Professor F. E. WYNNE (M.O.H. Sheffield) said he had been unable to satisfy himself that any of the processes carried out in elementary schools under the name of education had any influence on the conduct or manners of the children subjected to them. As to special education in hygiene, however admirable the syllabus prepared by the Board of Education might be in theory, it was generally crowded out of the curriculum, and if not was taught in a perfunctory manner which could produce nothing but a sense of boredom in the child. He believed the educational work done in welfare centres and in the homes of the people had some real practical value, but that the reduction in mortality was largely a response to the reduced birth rate and a generally higher standard of living.

Dr. WHEATLEY, in replying, maintained the value of education and deprecated attacks on the present system. The system was admittedly imperfect, but far better than the absence of any system at all. It was the work done in the elementary schools that enabled the scholars to take advantage of the special instruction that might be given to them in later years.

THE VALUE OF WATERCRESS AS A FOOD:

SUGGESTIONS FOR ITS EXTENDED USE.

BY

HAROLD SCURFIELD, M.D.EDIN., D.P.H.CAMB.

IN these days, when the need for economy interferes with bricks and mortar sanitation, the food question looms more important than ever. I believe if I had to pick out one factor more important than any other in the prevention of tuberculosis I should plump for food.

There is perhaps a danger that people may get sick of the talk about vitamins before they have adopted the principles in their daily dietary. For practical purposes the indications are simple: more of the protective foods—that is, milk, green vegetables, and fruit.

The results obtained by Dr. Cramer and his colleagues[1] seem to me very important, as being the first clear suggestion of the mode of action of the vitamins A and B. Further, it seems highly probable, as Dr. Cramer suggests, that a considerable section of the population, especially in towns, is existing, like the rats in a laboratory, on a vitamin-poor diet. For example, I think it is highly probable that the assumption which has been commonly made, that because we do not actually have beri-beri in this country we suffer no ill effects from a deficiency of vitamin B in our dietaries, is an ill founded one. We know that our bread and breakfast cereals lose their vitamin B owing to modern methods. Eggs are somewhat expensive. The effects of a vitamin-rich diet on rats, obtained by the addition of cod-liver oil and marmite to their food, are very remarkable. Similar results will probably be obtained by securing a vitamin-rich diet for human beings. Cod-liver oil is being used more and more, and I feel sure that Dr. Cramer's work will lead to a greater appreciation of the need for more attention being given to the way in which vitamins A and B act together in promoting, not only growth, but nutrition at all ages. We cannot go back to old methods of preparing cereals, but we can easily compensate for the loss of vitamin B by a more extended use of yeast extract as an article of food.

The principal object of this paper, however, is to bring forward another protective food which we might use much more extensively—namely, watercress.

I am told that watercress probably contains all three vitamins. It has only been tested for its content of vitamin C, but I understand the Medical Research Council is doing some work on it now. As a green food it has stood the test of thousands of years. It belongs to the same order as cabbage—namely, cruciferae, an order pre-eminent for anti-scorbutic qualities. Tradition has given it a reputation in the treatment of all kinds of diseases—for example, pulmonary disorders, gout, and rheumatism,[2] anaemia,[3] skin diseases, including eczema, constipation, and ulcers of the mouth.[4] The Greeks and Pliny thought it good for the mind, and others say it stimulates the appetite. Lorand says that it contains both iron and iodine. Watercress thus has a time-honoured and widespread reputation as a health-promoting food. The risk of enteric fever from watercress grown in polluted water has been mentioned from time to time, but I know of no evidence such as there is with respect to shellfish. The larvae of insects are also said to be a source of trouble sometimes. Thorough washing, and possibly a preliminary soaking for a few minutes in water to which salt has been added, would guard against the latter risk, if it is a real one. As regards the former, there should be no difficulty in arranging for inspection of the beds by the rivers pollution authorities.

Obviously, if there is to be an extended use, we ought to be in a position to say that the cress comes from sources which are above suspicion. The industry is quite important enough already to justify proper precautions, and the large growers would, I am sure, welcome inspection. I have lately visited several large watercress beds, and was much struck with the great care taken. A short description of the beds worked by Mrs. James of Covent Garden Market may be of interest.

The winter cress is known as brown cress, and is marketed from September till the end of May. There are about 15 acres of beds at Hurstbourne Priors, Hants, on low-lying land alongside of a river flowing from a sparsely populated chalk country. The beds average about 70 yards long by 16 wide, are lined with concrete banks, have a gravel bottom, and are fed by natural springs or artesian wells. The warmth of the well or spring water encourages growth. The water must be constantly on the move. The proprietors have their own well-boring plant, and provide trucks and lines for running up the cress from distant beds. All cress is washed in a special shed. It is pulled by men equipped with waders, bunched, trimmed, packed in baskets, and sent up to market by motor or train and sold within twenty-four hours of packing. The workers get better pay than farm workers, and an expert "buncher" can earn five shillings in six hours. The best of the roots and stems trimmed off are put back in the beds to form new plants.

The points which impress a visitor are the great care taken to get pure water, and a cress free from weeds, and to secure a fine growth by constant weeding, the use of artificial manure and the restocking of the beds with vigorous young growth.

At Mitcham Mrs. James grows green cress, which is marketed from April to September. Here there are about ten acres of beds, fed with water from the Wandle, a river which rises in the chalk hills. The green cress is cut when about six to seven inches above the water, so needs little subsequent trimming. The beds have to be constantly trimmed to prevent flowering and too coarse stems. The growth looked delightfully green, clean, and fresh, and one had no hesitation in chewing it on the spot. The beds here have a loamy bottom, but as the cress is not pulled this is no disadvantage from a cleanliness point of view. Amongst other cress beds which I visited were those at Croxley Hall Farm, Rickmansworth. Here there are about twenty acres of beds, fed with water from natural springs and artesian wells in the chalk. Mr. Sansom, the proprietor, grows brown cress in the winter and green in the summer, and supplies the North of England as far as Newcastle-on-Tyne. He has sent supplies to Scotland, but prefers to send to places where he can have the cress on sale within twenty-four hours of cutting.

From an agricultural point of view there is undoubtedly much land worth a nominal rent only which, if converted into cress beds, would be worth £15 to £20 an acre. All the beds which I have visited appear to be fed by rivers, springs, or wells from the chalk. I imagine limestone districts would be equally suitable. I think the encouragement of watercress growing is a matter worthy of consideration by our Ministry of Agriculture. I think also that the demand would increase if the public could be assured that the beds were inspected by some responsible authority. I need hardly point out that the inspection of watercress beds is not a difficult matter like the inspection of dairy farms. It is really only a side-show of rivers pollution inspection.

From a public health point of view watercress is a cheap green vegetable which, like lettuce, is eaten unspoiled by cooking, but which, unlike lettuce, is available all the year round. Its more extended use may therefore be an appreciable help in remedying dietary errors caused by urbanization.

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DISCUSSION.

Dr. E. LEWYS-LLOYD (M.O.H. Merionethshire) recalled several instances showing the value attached to watercress by tradition in Wales and elsewhere.

Dr. R. D. SMEDLEY (M.O.H. West Sussex) said that watercress had lost favour in recent years, but had formerly been a much esteemed delicacy. It was still so regarded in parts of France, where it was grown and consumed on a very large scale. He considered it was of great importance to encourage the consumption of green uncooked vegetables, and agreed that watercress supplied a most valuable element in diet.

Dr. WHEATLEY (C.M.O. Shropshire) hoped that careful biological experiments would be made to determine the special value of watercress as opposed to ordinary green vegetables. General conclusions as to its value, whether past or present, were not sufficient in view of the possible risk of infection through eating watercress from polluted waters. This danger had been reported very fully by the late Sir Shirley Murphy, who had been able to trace quite definitely several cases of typhoid fever to infection from this source. On the other hand, if watercress could be produced in sufficient quantity and at a sufficiently cheap rate to provide a real supply of green food, and if it could be efficiently protected from infection, it would prove to be of real value. He thought Dr. Scurfield was to be congratulated on bringing the matter forward.

Dr. SCURFIELD, replying on the discussion, thanked the members of the Section for the interest they had shown in the subject. He considered increased use of raw green vegetables to be a matter of real importance, and when he said inspection would be an easy matter he referred to regular cultivated beds, and not to odd sources of supply. His experience was that most people, including children, liked watercress. He mentioned the traditional properties of watercress, not because he believed in them all, but because of their historical interest. It was also his experience that much more watercress was eaten in France than in this country. Dr. Scurfield also read a letter addressed to the President of the Section (Dr. Mearns Fraser) describing how watercress could be profitably grown during the autumn and winter in an ordinary garden frame.

DISCUSSION ON THE EFFECT ON HEALTH OF SEWER AIR AND DRAIN AIR.

OPENING PAPER

BY

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THERE is a tendency in sanitary practice, as in other forms of procedure, to become, as it were, crystallized, so that it fails to respond at once to changes in theory. A certain inertia is no doubt an advantage, as it gives time for the confirmation of truth and the elimination of fads.

It is, of course, always the duty of the sanitarian to ensure that his practice is, as far as possible, in accord with modern theory, but the strictest scrutiny is more particularly necessary in these days when public health estimates, both national and local, have had to be cut to the quick. It is also most important that we should exercise the same care in making demands on property owners that we do in administering the public funds at our disposal, since every pound unnecessarily spent lessens the purchasing power of the nation, and so contributes to poverty and unemployment—the main causes of public ill health.

In view of the appalling sanitary conditions which had been allowed to develop prior to the passing of the Public Health Act of 1875 it was natural and right that the attention of our predecessors should be largely concentrated on the abatement of nuisances generally, and especially the efficient removal of excreta from dwellings by properly constructed sewers. This was in accord with the principle that all life is destroyed by the accumulation of its own products, which applies to communities just as it does to individuals. The improvement in public health resulting from these measures very soon became apparent, but the work then inaugurated is even now far from complete.

As long as there are slums, unpaved yards, privy middens, and open ashpits left in our towns, I believe that it remains the first duty of the sanitary authority to proceed with their elimination, and that the energies of medical officers in particular should not be entirely diverted to the more fashionable pastime of dealing with the individual and prolonging the lives very often of the least desirable elements in society.

While the principles of the Public Health Act were thus absolutely sound, and its effects of inestimable benefit, it was not unnatural in those days of imperfectly understood etiology of disease—when, for instance, Murchison's pythogenic theory of typhoid fever was still an article of faith—that defective drains and sewers came to be regarded as one of the principal factors, if not actually the principal factor, in the causation of epidemic and infectious diseases.

Typhoid fever and diphtheria in especial were attributed to faulty drainage, and this association still lingers in many minds. Modern views of the etiology of these diseases make it certain that the causation of either of them by the escape of drain or sewer air into the dwelling house is a remote improbability, if, indeed, it is even a possibility.

Nevertheless it seemed intolerable at one time to abandon the idea that faulty drains had an important influence on the incidence of these diseases, to admit that all our elaborate precautions against the reflux of air and gases from the sewer to the drain, or from the drain to the

living room, were unnecessary and wasteful; and it is still a common practice whenever a case of either of these diseases is reported to "examine the drains," and when they are found pervious to the smoke test, as they so frequently are, to insist on a more or less costly reconstruction. From the point of view of the doctor also, when the source of infection of a case of diphtheria was obscure, it was hard to be deprived of the old fetish of drainage, always so convincing to the patient and his friends, provided they were tenants, but equally a matter of extreme scepticism on the part of the owner of the property.

To justify our attitude, once it was realized that the actual micro-organisms responsible for these diseases could hardly ever, if at all, be conveyed by air polluted by the drains, we had to fall back on the theory that the inhalation of such air "lowered the resistance" of the patient, and was thus indirectly responsible not only for diphtheria but for many other infections, especially of the throat. It is this theory which is now challenged, and inasmuch as the reconstruction of drains costs a great deal of money, it is, I think, our duty carefully to examine the theory, to ascertain how drain air lowers resistance—if it does—and, in fact, whether we are justified on these grounds in demanding a considerable expenditure by owners of property. I must at this stage make it clear that I refer only to drains which are not gas-tight as proved by the smoke test. Drains which are so faulty as to permit pollution of the soil by liquid sewage, with all its putrescible organic matter and high bacterial content, are on an entirely different footing, and it would not, I think, be difficult to prove that such contamination of the soil might well be, and often is, a factor in the production of disease.

With regard to atmospheric pollution, however, recent hygienic doctrine is very subversive of once general opinions. Rosenau[1] says of it:

"Sewer gas, once a hygienic bugaboo, is now not seriously regarded by sanitarians. People naturally cling to the idea that anything that smells bad must be detrimental to health; sanitarians know, however, that our sense of smell is a very poor sanitary guide. Sewer gas is nothing more or less than air containing the volatile products of organic decay coming from sewers and drains. Some of these gases are more or less poisonous, but not in the great dilution ordinarily found in sewer air. As a matter of fact the air of sewers is ordinarily freer of dust and bacteria than the corresponding outside air, although it may be a little higher in carbon dioxide—10 to 30 volumes per 10,000. It is absurd to regard sewer gas as the cause of diphtheria, typhoid fever, scarlet fever, and other communicable diseases."

I think the logical way of approaching the question is to consider first the antecedent probability of such air actually causing the alleged lowered resistance, or as it is often called in rather vague language, "lowered vitality of the tissues," and then to examine any available evidence as to its actual effect on human or other animals. The supposed effect must evidently depend on the presence of micro-organisms or of chemical substances of a more or less poisonous nature.

This has been the subject of so much research that it is only possible to refer briefly to a few of the results obtained. Taking first the chemistry of the subject, we may dismiss the slight excess of carbon dioxide as negligible from the physiological or pathological point of view. Sulphuretted hydrogen is, of course, a lethal gas when in sufficient concentration. It has been the cause of many fatal accidents to men working in connexion with sewers, and was even described by Sir Benjamin Richardson as "the true disease-producing agent in sewer air."

This gas is not, however, a normal constituent of sewer air, mainly on account of its great solubility in water, and it is only in exceptional circumstances, where sewage is stagnant and decomposing, that it is evolved in sufficient quantities to become poisonous. Drs. Haldane and Hurtley found that the smell of sewer air was not due to H_2S, but to traces of volatile aromatic bodies—indol, skatol, and the mercaptans. It must be admitted, I think, that the presence even in extreme dilution of such very unpleasant bodies in the air of a house might cause loss of appetite and even a more or less psychic nausea and sickness. But in my experience such odours are always the subject of early complaint and are remedied before any actual illness arises.

When we consider the bacteriology of the question we find again a mass of research work all of which tends to acquit sewer air of its supposed pathogenic properties. Most of the experiments carried out by such authorities as Miquel in Paris, Haldane, Carnelly, and Delépine in England, Winslow and others in America, show that the bacterial count of sewer air is generally less than that of the outside air in the immediate neighbourhood, in spite of the enormous bacterial content of sewage. There is one important difference in this respect between sewer air and drain air, the latter being more liable to give a high bacterial count. This is because bacteria held in suspension in liquid sewage can only escape into the air as the result of splashing, which occurs much more frequently in drains than sewers. This effect of splashing, however, has been shown to be strictly localized and very temporary, the bacteria very soon returning to the liquid under the action of gravity. Both Delépine and Winslow came to the conclusion that most of the bacteria in sewer air were derived not from the sewage but from the outside air.

Both chemical and bacterioscopic results, therefore, indicate that the probability of air contaminated by sewers or drains causing disease, or even predisposing to it, is very low indeed.

We have next to consider what is known of the actual effects of the inhalation of such air on the living organism. Apart from experiment there is first of all the well known fact that men working continually in sewers are at least as healthy as any other section of the community, and that there is among them no excessive incidence of the diseases popularly associated with "sewer gas." That this is not due merely to an acquired tolerance to potential poisons is shown by the fact that occasional workers in concentrated sewer air, such as the numerous experts who have carried out the researches I have quoted, have experienced no ill effects from their exposure to sewer air.

When we come to experimental investigation the results are very similar. In 1896 Dr. Alessi published the results of his experiments in "Putrid gases as predisposing causes of typhoid infection."[2] He exposed rats, previously inoculated with attenuated strains of *B. typhosus* and *B. coli*, to the concentrated effluvia from an untrapped water-closet—a very different thing from sewer air or drain air—and found that under these conditions the susceptibility of the animals was enormously greater than that of the controls, 80 per cent. dying after inoculation, as compared with 3 per cent. of the controls. This experiment has, of course, no bearing on the effect of sewer air or drain air, as this is not what the animals were in fact breathing.

On the other hand, Professor Delépine found no difference in the health of animals kept in a room in which the air was entirely derived from a Manchester sewer and in those kept in a room in which the air was drawn from an adjoining garden.

Winslow and Greenberg in America exposed guinea-pigs to strong odours and gases from decomposing faeces, and found a retardation of growth during the first week, after which the animals returned to the normal in health and rate of growth.

The last test which can be applied is the degree of association between the actual incidence of diseases of the type under discussion and defects in drainage arrangements.

In Leeds a very careful investigation on these lines was made during the years 1899 to 1901. It was found that the percentages of drain defects in 5,342 houses where typhoid or diphtheria had occurred, and in 2,275 houses in which no disease had occurred, were respectively 27.94, 27.88, and 27.30—a virtual equality.

In Gloucester a similar inquiry showed that house-to-house inspection gave a percentage of 23.4 of drain defects, while in houses attacked by infectious diseases the percentage was only 11.3.

In St. Helens the house-to-house percentage was 21.4 with defects, in houses where typhoid had occurred 19.3, and where diphtheria had occurred 10.1.

The evidence on the whole of this question is summarized in the admirable Report of the Departmental Committee on Intercepting Traps in House Drains, from which part of the material for this paper has been obtained. Dr.

Haldane is there quoted as giving his opinion that the theory of sewer-air infection was based on worthless evidence, that as a general rule illness was put down to sewer air if the cause was unknown, and that he was even very suspicious of the theory that sewer air, apart from its smell, can be a predisposing cause of disease.

These are not new facts. They have been known and admitted for years, yet we seem to lack courage to act on them. We retain by-laws which require the provision of intercepting traps often at a considerable cost; we insist on systems of sewer ventilation which often create far more nuisance than the imaginary ones they are designed to prevent; and if we succeed in getting smoke, under a pressure to which drain air is never subjected, to make its way through some minute flaw, we call upon the owners of the property to relay drains at a cost which may be almost ruinous in these difficult and harassing days.

It took a generation to educate the public into a horror of insanitary conditions, and it is perhaps natural that there should be some reluctance to teaching anything that might weaken that dread, perhaps also a little timidity in opposing tradition and orthodoxy. But now that experience has shown us which are the really useful and economic lines of sanitary reform, I think it is essentially our duty to point these out and insist on their being put into operation, while rigidly preventing unnecessary expenditure on what we now know to be merely the bogies of an outworn creed.

REFERENCES.

[1] Rosenau: *Preventive Medicine and Hygiene*, 1921. [2] *Journal of the Royal Sanitary Institute*, vol. xvi.

DISCUSSION.

(The chair was taken by Dr. LOCKHART STEPHENS.)

Dr. MEARNS FRASER (M.O.H. Portsmouth) said he thought it would be difficult to draw the line as to when a drain became so defective as to be dangerous, and he was personally inclined to continue on the safe side. From the practical point of view he found that defects or alleged defects in drains were very often reported by private medical practitioners, and if they took the line of refusing to act on such information it might involve them in controversies with the general practitioner. He did not quite appreciate the distinction drawn by Dr. Wynne between soil pollution and air pollution. It was often believed that food poisoning might be caused by contamination of foodstuffs by drain air. He emphasized the fact that defective and untrapped drains might serve as rat-runs and in this way become a danger and a nuisance. He felt it was probable that the danger of inhaling sewer or drain air was exaggerated, but that, on the other hand, it might be dangerous to assert its positive harmlessness.

Mr. WYNTER BLYTH, D.Sc., F.I.C., in a very interesting communication, criticized much of the experimental work which had been done in connexion with the bacteriology of sewer air, which, he said, had in many cases been carried out by people who were quite vague as to the chemico-physical problems with which they were confronted. Sewage, he said, was a variable mixture of inorganic salts and organic compounds both in solution and suspension, and a large part of the suspended matter was in the colloidal state. House sewage tended on agitation to form froth and bubbles. The gases composing the air of sewers and drains did not differ materially from ordinary air except for variable quantities of the gases of decomposition whose concentration would be more or less proportional to the state of ventilation. Apart from the physiological or psychological effects of inhaling evil-smelling gases one would accordingly expect no ill results from such inhalation provided the air were free from micro-organisms. The main point therefore appeared to be to inquire to what extent and under what conditions organisms could be carried from sewage to sewer air, and how long they could remain in suspension in the air and retain their vitality. There was no doubt that organisms could be thrown into the air, not only by splashing but by the bursting of bubbles and breaking down of foam. Horrocks, in his experiments published in the *Journal of the Royal Sanitary Institute* (No. XXVIII), had obtained a positive result in a plate exposed, in one case 9 ft. and in another 11½ ft., above the surface of the sewage, but unfortunately published no data as to the draught in his experimental pipes, the conditions under which the organisms were ejected, or the condition in which they were when so ejected. With a view to determining some of these factors he had himself recently conducted certain experiments which showed that the pressure inside a bubble was maintained by the surface tension of the liquid—the higher that tension the greater the pressure per unit area of the surface of the bubble. In accordance with this law he had obtained a positive result with plates exposed at 9 inches above ordinary tap-water containing *B. typhosus*, but the result was negative at one foot above the surface. In another experiment under identical conditions, but with soap solution instead of water, growths were obtained at 4 inches, but not at 6 inches. Further experiments had been made to determine the distribution of organisms in frothing solutions of gelatin and soap. The results were not so far conclusive, but he felt justified in saying that there was evidence of some concentration of organisms in the froth—that was to say, the organisms were not driven out from the air-liquid interface. It was proved that the thinnest bubble—that is, one with a film of about 0.0017 μ in thickness—could carry a micro-organism with a diameter some 17,000 times greater than this. When a bubble breaks there is no "explosion," but the film, as it were, "flaps back" at a rate of seventy-two miles per hour, and it is this force which ejects the comparatively enormous organism. Absorption of liquid by the organism is one of the factors in determining its convection by light currents of air, and such absorption is minimized if the organism has been in contact with grease, which is one example of the complexity of the problem. However, it was found by experiments with *B. prodigiosus* that the maximum time taken to fall through 100 cm. when discharged from a bubble of soap solution was one minute, and when discharged from a bubble of gelatin solution forty-five seconds. By applying Stokes's law the radius of the particle of liquid containing the organism is found to be in the first case 11.7μ, and in the second case 15.8μ. The volume of the globule of water and organism to that of the naked organism is therefore about 1,000 to 1. Nevertheless these particles are small enough to be carried considerable distances by low velocity currents of air, as much as 6 ft. in a draught of only 30 ft. per minute.

Dr. SCURFIELD (late M.O.H. Sheffield) mentioned a personal experience of residence for a considerable time in a house in which eventually smells called attention to the drainage, which was found to be profoundly defective. He could not say that any of the occupants had experienced any ill results in regard to their health. At the same time he thought it would be dangerous to ignore serious defects, as if a drain were pervious an accumulation of sewage in the foundations might be the first indication of a blocked drain. He had advised health committees for twenty years that diphtheria could not be caused by drain air, but that inhalation of such air might lower the general health and therefore the resistance to infection. He asked, If drain air was innocuous why were the effluvia from privy middens dangerous? He hoped that further research would be carried out by Dr. Wynter Blyth on the very interesting lines of his paper, as before any alterations in by-laws could be adopted it would be necessary to convince the architects of the Ministry of Health.

Dr. G. H. PEARCE (M.O.H. Batley) was of opinion that all defects in drains should certainly be made good and no second-rate work permitted, but the findings of the Departmental Committee on intercepting traps had greatly modified their ideas as to the effects of sewer air. He found that typhoid fever was mostly spread by flies and the consumption of shellfish, and diphtheria by carriers

and presumed that no one would suggest that drain air had any connexion with the spread of scarlet fever or other infectious diseases.

Dr. Johnson Smyth (Bournemouth) believed that many cases of chronic illness or debility were maintained by the inhalation of sewer gas, and that this was demonstrated by the improvement that followed removal to healthier conditions.

Dr. Wynne, in reply, especially thanked Dr. Wynter Blyth for contributing to that Section the results of his original and most valuable recent research work. He thought those results largely confirmed his own conclusions. He had already emphasized the distinction between defects which only permitted the escape of air or other gases and gross defects which permitted the escape of liquid putrescible matter. The objection to privy middens did not depend only on their foul emanations, though these were much more serious than drain air and quite capable of producing loss of appetite and sickness. They were always breeding places for flies, and in one case he had been able to trace an outbreak of typhoid fever to the emptying of infected faeces from a privy midden on to an unpaved yard, whence the infected material was carried into the adjoining houses either as mud or dust. He realized that to deprive the family doctor of the time-honoured theory of bad drainage as a cause of unaccountable disease might be a serious blow to him, but he did not think it was good either for the public or the profession that they should continue to promulgate doctrines that they knew to be false, while it was essential that every effort should be made to trace disease to its true source.

CARBON MONOXIDE A PREDISPOSING CAUSE OF PULMONARY TUBERCULOSIS.

BY

E. B. HAZLETON, M.D., M.Ch.

About twenty years ago I was consulted by a male patient, aged 38, who suffered from morning headache, anorexia, some shortness of breath on exertion, and lassitude. Remedies such as preparations of iron, arsenic, digitalis, failed to effect much improvement, and, some years after I first saw him, he contracted pulmonary tuberculosis. On visiting him for the first time in his bedroom I detected a distinct odour of coal gas. He had occupied the room for a period of ten years, and the conditions had been about the same during that time. I came to the conclusion that the first illness was due to the nightly inhalation of small quantities of coal gas.

From the observation of a large number of similar cases I was led to conclude that the inhalation of coal gas, even in very small quantities, continued for a considerable period, may be a predisposing cause of tuberculosis.

Placed in order of quantity the constituents of coal gas are:

Hydrogen,
Marsh gas (methane),
Carbon monoxide,
Olefiant gas (ethylene),
Acetylene,
Nitrogen,
Carbon and sulphur dioxide,
Hydrogen and ammonium sulphide,
Carbon disulphide.

Out of this list I only propose to consider the action of carbon monoxide.

A sample of air was taken from a bedroom in which there was a slight escape of gas. An empty oxygen cylinder, having the valve widely open, was left in the room over night, and early in the morning a foot pump was placed on a level with a sleeper's head and the air of the room pumped into the cylinder to a pressure of 100lb. per square inch, and the valve closed.

Mr. Wiggington, lecturer in the Department of Fuel Technology, Sheffield University, very kindly undertook the analysis of the contained air. As a result of the analysis we may conclude that where we are enabled to detect the presence of coal gas in a room by the sense of smell, the amount of carbon monoxide present will be about 0.02 per cent., and that in quite a large number of cases 0.01 per cent. is present.

The blood of an average man is capable of absorbing 600 c.cm. of either oxygen or carbon monoxide, when it is said to be saturated. If both gases are present in the inhaled air the haemoglobin of the blood will combine with the carbon monoxide in preference to the oxygen—the ratio being 200 of the former to 1 of oxygen.

Fig. 1.—A type of gas bracket frequently fitted in bedrooms.

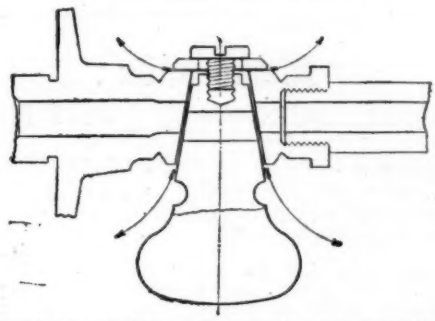


Fig. 2.—Showing a condition which nearly always results after some months' use. The retaining screw at the top of the tap becomes loosened and the tap sags downwards, permitting the gas to escape, as shown by the arrows.

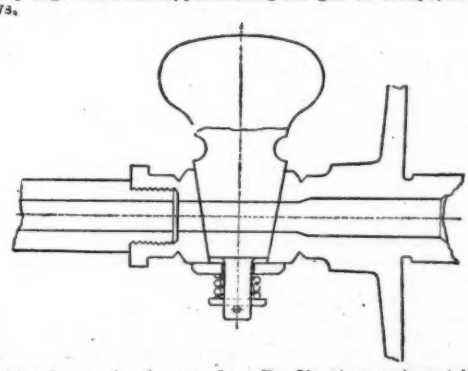


Fig. 3.—Showing a simple remedy. By direct experiment it is found that the spring is unnecessary, as, if the tap be placed as shown, the force of gravity will be sufficient to keep the sides in close apposition and thus prevent all escape of gas.

The ordinary rate of breathing when a man is at rest is 7 litres of air per minute, of which 5 litres reach the blood, so that if the air of a room contains the very small quantity of 0.01 per cent. of carbon monoxide, then 0.5 c.cm. of this gas will reach the blood per minute; and assuming that all this is absorbed, in one hour the blood will absorb 30 c.cm. and become 5 per cent. saturated, and in eight hours will become 40 per cent. saturated.

Le Neve Foster and Haldane have, however, found in their investigations of mine air that only three-sevenths of the carbon monoxide which reaches the blood is actually fixed by the haemogoblin; hence in eight hours the amount of saturation would be rather over 17 per cent., and this amount of saturation is quite sufficient to produce the symptoms of morning headache, shortness of breath, anorexia, lassitude, and, after some months, anaemia. We can readily understand that, in consequence, there may be a distinct inhibition of phagocytosis and a lowering of the resisting power of the mucous membrane and epithelial lining of the bronchi to the invasion of tubercle bacilli.

DISCUSSION.

Dr. Wynne (Sheffield) said the object of Dr. Hazleton's paper was very interesting in connexion with the previous discussion. There could be no question as to the harmfulness of coal gas even in very high dilution, especially in

view of the high percentage of CO in modern gas. He thought it was not generally realized how common this form of pollution of air was, and Dr. Hazleton's suggestion for its remedy was as valuable as it was simple. He thought it not unlikely that conditions commonly attributed to sewer gas were due to this cause.

Dr. SCURFIELD agreed that Dr. Hazleton had called attention to a matter of very great importance in connexion with the public health. The danger of leakages of gas was increased by the fact that many persons were very insensitive to its smell, and so might remain unaware of quite poisonous amounts in the air they breathed.

Several other speakers thanked Dr. Hazleton for calling attention to a matter of such practical importance, and hoped that his method of prevention would in time become general.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

ASTHMA DUE TO INSECT POWDER.

MRS. D., an apparently healthy woman of 24, consulted one of us (J. R. G.) on August 10th, when she was found to be suffering from a severe attack of asthma.

Her history was that on August 7th, at about 6 p.m., she bought a tin of a well known brand of insect powder and sprinkled some of it on her bed, on which a dog had been lying. In about half an hour she noticed that her eyes were watering, sore, and itchy. When in bed that night she had the first stages of an asthmatic attack. She could not "get her breath" and there was a "catch" in breathing. The next day she had little to complain of, but that evening and night she felt worse. The attack was most severe on the following night (August 9th). When seen on August 10th the signs and symptoms were those of severe bronchial asthma. Under appropriate treatment she gradually improved, and at the end of a week was quite comfortable during the day and only slightly "wheezy" at night.

Only once previously had she suffered from asthma. That attack came on about a year before when she was staying in the country on holiday. The previous occupant of her bed had been a lady who had three dogs, and before Mrs. D. arrived the landlady had made free use of insect powder on the bed. The attack developed the first night Mrs. D. spent in the bed, and, after three days of misery, she returned home and was completely well within a week.

The only one of her relatives who suffers from asthma is a maternal aunt who has been a frequent victim from her girlhood. In her case no connexion between attacks and either food or environment has been noticed.

In order to confirm or rebut Mrs. D.'s conviction that the powder was the cause of her attack, her sensitiveness to it was tested by the other recorder (J. W. B.). A few superficial scratches were made on each forearm. The abraded surface on the right arm was rubbed with carbol saline, that on the left with a suspension of the powder in the same solution. Within five minutes there was a marked difference between the two arms. The scratched surface on the right was surrounded by a slightly hyperaemic zone, but that on the left forearm showed as a raised white wheal in the centre of a bright red patch. The reagents were then washed off with salt solution. The condition was kept under observation for a further ten minutes, when the visible and palpable wheal was much more marked and the red zone larger. The subject stated that it was rather itchy. When seen six hours later there was but little difference between the arms, and Mrs. D. said that the swelling had almost completely disappeared within an hour from the commencement of the experiment. In view of the very rapid and marked skin reaction there can be little doubt that Mrs. D. was very sensitive to the powder and that it was the cause of her attack of asthma. No attempt was made to immunize her against the substance as it is one fairly easy to avoid. Since she has only suffered from these two asthmatic attacks it seems probable that her range of sensitiveness is small. She was not tested with any other substance.

The makers of the powder did not reply to my question as to its composition, but it apparently consists, in whole or part, of pyrethrum, and it is probable that this substance was the responsible agent.

The case seems worth recording since, so far as we have been able to discover, no similar case has been noted before.

J. R. GARRATT, M.D.,
Kingstown.
JOSEPH W. BIGGER, M.D., F.R.C.P.I.,
Dublin.

SYPHILITIC STRICTURE OF THE SMALL INTESTINE.

THE following case of severe generalized syphilis, with syphilitic stricture of the small intestine, causing intestinal obstruction and resulting in death, presents some interesting features worthy of record.

A man, aged 45, was admitted to hospital on December 6th, 1922, complaining of severe gastralgia which began about a week earlier. He had been troubled by frequent attacks of indigestion for twelve years, with occasional vomiting. He had served as a regular soldier in India, where he had slight malaria, and he had been a rather heavy drinker for many years. For the most part, however, his health had been good. During the war he served in Salonica, where he got a fresh infection with malaria in 1917, but was not seriously ill, and the last attack of malaria was in 1921. He had iritis in the left eye in 1915.

On admission he was pale and thin, and the lymphatic glands on both sides of the neck were enlarged and hard. There were no abnormal physical signs in the heart or lungs. The left pupil was "pin-point" and fixed, apparently due to the old iritis. The right pupil was normal in size and reacted slowly to light, and more actively to accommodation. Deep reflexes and sensation were normal. There was slight tenderness over the pylorus, but the abdomen was difficult to palpate, as the recti muscles were rigid. He vomited occasionally, even when on a diet of bread, milk, and pudding. The bowels tended to be constipated. An Ewald test meal, given on December 10th, revealed a total absence of free HCl, and a total acidity of 10—that is, there was a complete achylia gastrica. No Boas-Oppler bacilli were found. On December 15th the Wassermann reaction of the blood was reported positive. X-ray examination showed the stomach to be normal in size and position, and that it emptied itself in five and a half hours. There was no evidence of narrowed pylorus or tumour formation. The patient was put on dilute hydrochloric acid with pepsin, and on mercury and potassium iodide. At the end of December intravenous injections of 0.3 gram novarsenobillon were begun, but after each there was so decided an exacerbation of pain in the stomach that the injections were stopped after the third.

He did not improve, but became sick more frequently, so that at first medicines and then food by the stomach had to be stopped, and bowel feeding was resorted to. He became more emaciated and the sickness continued. Early in February, 1923, he had a twitching of the left eye which lasted for three minutes, and he was dazed for some time afterwards.

The patient was transferred to the surgical department on February 17th, as a last resort. He was then very weak and emaciated, but the appearance of the abdomen was striking. It was well and uniformly filled and firm, in marked contrast to the extreme wasting of the rest of the body. With the object of introducing peptonized milk directly into the small intestine an incision was made in the epigastrium, and a loop of small bowel was picked out. This loop presented a stricture, about 3/4 inch in length and 1/4 inch in external diameter, which was very firm, and avascular. On both sides of this stricture the bowel rapidly expanded to fully an inch external diameter. The fullness of the abdomen was largely due to great infiltration of mesenteric glands and retroperitoneal tissues. An enterostomy was rapidly performed below the stricture, and the patient fed; he was also stimulated with radiant heat, pituitary extract, etc. The temperature, which had fallen to 96°, rose almost to normal, and for a time he retained nutrient injections and salines, and slept well. Three days later, however, he died.

Post mortem, in addition to the retroperitoneal masses, masses were found in the liver and the upper pole of the left kidney, and large firm masses in the mediastinum. Microscopical examination showed these masses to be gummatous. The stricture of the intestine was situated in the jejunum, and, on section, the very narrow lumen was found to be neatly closed by a grape seed which acted as a ball valve, the little projection at one end of the seed entering the stricture and acting as the valve stem or guide. The thick walls of the stricture showed gummatous infiltration.

We are indebted to Drs. E. Currie and M. Davidson, resident medical officers, for the use of notes made upon this case.

W. K. ANDERSON, M.B., Ch.B.,
Physician,
J. A. C. MACEWEN, M.B., C.M., F.R.F.P.S.Glas.,
Surgeon,
Eastern District Hospital, Glasgow.

Reports of Societies.

EXPERIMENTS WITH "DIAPLYTE" TUBERCLE ANTIGEN.

A MEETING of the Section of Pathology of the Royal Society of Medicine was held on October 16th, with Dr. J. C. G. LEDINGHAM in the chair, when Dr. E. H. KETTLE gave a communication on experiments with defatted (diaplyte) tubercle antigen.

Dr. Kettle said that on analysing Professor Dreyer's original paper it seemed that the claim that the new antigen was efficacious in the treatment of tuberculosis rested mainly upon the treatment of four guinea-pigs which had been infected with a strain of tubercle bacilli of low virulence. The evidence that the course of the disease was favourably influenced by the treatment was (1) the increase in weight of the animals, (2) the diminution in size or disappearance of palpable lesions, and (3) the fibrosis and scarring of lesions in such animals as died. Dr. Kettle's experiments showed that these changes could occur naturally in guinea-pigs infected with tuberculosis without any treatment at all; further, that the most intense sclerosis and scarring of tuberculous lesions in one part of the body might be associated with the rapid progress of the disease elsewhere. Dr. Kettle's attempts at treatment of guinea-pigs had been carried out with an antigen (No. 58) given him in June by Captain S. R. Douglas, F.R.S., who had himself received it from Professor Dreyer. Recently Captain Douglas had reached the conclusion that this particular batch of antigen was unsatisfactory and that no great reliance could be placed on the results obtained therewith. Dr. Kettle said that the results of his own experiments were in any case ambiguous; some of the animals showed healing of lesions, but this was associated with active progress of the disease elsewhere. The general conclusions arrived at by him were that in view of the nature of the lesions to be seen in his control animals, which were demonstrated, the efficacy of the antigen in the treatment of tuberculosis in guinea-pigs had not been established; and that in view of the natural healing which tended to occur in these animals, comparable with the changes familiar in human pathology, much sharper reactions must be obtained before the value of any antigen could be considered to be demonstrated experimentally.

Pollen Antigen Prepared by Dreyer's Method.

Dr. J. FREEMAN read a paper on pollen antigen prepared by Dreyer's method. He said that it seemed interesting to try whether Dreyer's technique for the defatting of bacterial vaccines preparatory to constructing an antigen from them would prove a useful method for the defatting of grass pollen before extracting an antigen from it. The interest lay in the fact that the strength of the grass pollen antigen could be very accurately determined by suitable experiments on the skin of sensitive (hay fever) subjects. For years the process of defatting the pollen before extraction had been carried out regularly, and it had only essentially differed from the full Dreyer technique in that there had been no initial fixing with formalin. This was, of course, the one point in which Dreyer's technique had differed from the previous work of Captain Stewart Douglas. Five grams of pollen were extracted by Dreyer's method, and two other specimens of 5 grams were extracted as controls, one of them in exactly the same way as the Dreyer method without the formalin, the other in the more usual manner of the laboratory. The preparations were tested on a number of patients and on a number of different occasions. The extract made according to Dreyer's method proved itself to be from 200 to 1,000 times weaker than the other extracts. This would suggest that either the antigen was extracted in the formalin, or else that the formalin combined with and spoilt the antigen. If anything comparable happened in connexion with the tubercle bacilli it showed that the Dreyer defatted vaccine was very much weaker than the bacillary emulsion, which, in Dr. Freeman's opinion, might very well be consistent with its being more effective.

Etiology of Malignant Disease and the Leukaemic Phenomena.

Dr. JAMES YOUNG read a paper entitled "Further observations on the etiology of malignant disease and the leukaemic phenomena," illustrated with microphotographic slides. He stated that in cancerous tissue there were rounded or oval yeast-like bodies which could be seen to germinate when the tissue was incubated. While adapted to the living tissue they were ill adapted to the test tube and became rapidly changed into elements suited to the new environment. In this way a cocco-bacillary flora was obtained, which was easily stabilized on the laboratory medium. During its germination the yeast-like body became pale and in the "plasm" minute granules appeared which subsequently enlarged into the familiar flora. Thin threads and filaments frequently appeared as an intermediate phase. Dr. Young had long believed that the organism locked up in the cancerous tissue had the characters of a fungus. He described a fungus which he had obtained from seven cancerous tumours. This was stable on a dry medium, possessing branching hyphae and conidia, but in a fluid medium was extremely unstable and rapidly broke down into cocco-bacillary elements. During the process yeast-like "plasm" and filamentous phases were common, and in every detail the morphological picture found in the incubating cancerous tissue was reproduced. Injection of the bacillary phase of the organism obtained from mouse cancer produced in mice a diffuse and progressive neoplastic lesion (pseudo-leukaemia or lymphosarcoma) in which the organism appeared not in the form of the bacilli injected but as yeast-like elements. By incubating the affected tissues these rapidly became transformed into cocco-bacillary elements and the morphological process was again similar to that in incubating cancerous tissue. Dr. Young pointed out that the investigations of Hort, Löhnis and Smith, Mellon, Almquist, Reid and Orr, de Negri, and others had proved beyond doubt the varying morphology possessed by familiar laboratory bacteria, which were to be looked upon as stabilized phases of organisms that in other conditions of growth possessed "plasm" and blastomycete characters. He showed that the organism used for his experimental injection was a lactose fermenter, belonging to the *B. coli* group. From the chronic lymphosarcomatous lesions, on the other hand, in the majority of cases a non-lactose fermenter belonging to the Salmonella group was obtained. The original organism produced a slowly progressive neoplastic lesion, but the latter organism produced an acute rapidly fatal lesion, although in its gross anatomy this might resemble the other. The sequence of the experiment implied clearly that the non-lactose fermenter was a secondary invader or that it was a mutant. If the latter were true it meant that cancer and the leukaemic phenomena were linked up with the typhoidal infections. In this connexion it was striking to note that the typhoidal lesion was essentially proliferative and might possess true malignant properties (Mallory) and that the possibility of the leukaemic phenomena being related to the typhoidal infections had already been mooted (Ewing). Dr. Young gave reasons for his belief that in the healthy animal the only cells that could, after infection, proliferate in a tumour-like fashion were the primitive cells. This finding had a striking analogy in the parasitic tumours of plants. It explained the leukaemic phenomena and at the same time the difficulty of producing cancer by artificial infection. It had long been recognized that a lengthy preparation of the mature cell was necessary for cancer to occur, and Dr. Young described experiments supporting his view that chronic irritation (tar, soot, heat, *x* rays, etc.) operated by throwing the mature cell back to the primitive state, when alone infection would produce cancer. In each of four experiments, comprising in all 152 mice, the animals were divided into two batches. One lot was vaccinated with the organism of the research, the other was kept as controls. All the animals were painted with tar twice weekly. The results were that after seven months in 76 controls there were 25 tumours, whereas in 76 vaccinated animals there were only 5. These experiments supported the view that tar cancer was due to infection of damaged cells by an organism which was a common denizen of the laboratory cage.

TREATMENT OF PUERPERAL SEPSIS.

A MEETING of the Section of Obstetrics and Gynaecology of the Royal Society of Medicine was held on October 4th, with Dr. CUTHBERT LOCKYER, President, in the chair, when Mr. GORDON LUKER read a paper on the treatment of puerperal sepsis by a combination of antistreptococcal serum with intravenous and intramuscular injections of quinine bihydrochloride. This method had been used by him in a series of cases of puerperal septicaemia during the past twelve months with extremely satisfactory results. Thirty-six cases of puerperal septicaemia were admitted to the London Hospital in the year under observation, of which twenty-four had been treated by this method, with only two deaths. Both of the patients who died had suffered from toxaemia of pregnancy and antepartum pyrexia. Previously, the mortality among hospital cases had been about 35 per cent. Up to the present small doses only of quinine had been given, the maximum being 5 grains. The paper was illustrated by charts of all the cases treated.

Dr. EVERARD WILLIAMS showed a specimen of adenomyoma occurring in a bicornuate uterus. The subject from whom the specimen was obtained was a single woman, aged 31, who had absolute amenorrhoea, with severe abdominal pains each month. In each side of the pelvis, situated at the junction of the Fallopian tube with the uterine horn, was a small solid tumour which on section was found to be adenomyoma.

Mr. W. GILLIATT described a condition in which a patient had had a placenta praevia in four successive pregnancies. The patient had been pregnant only four times and the children had all been male; two of them were now alive and well, and two were stillborn. No abnormality of the pelvic organs could be detected during pregnancy, in labour, or in the intervals between the pregnancies. There were only two other cases recorded in the literature in which placenta praevia had occurred more than once in the same patient.

Drs. H. WILLIAMSON and G. F. ABERCROMBIE communicated a note on a case of inversion of the uterus caused by a squamous-celled carcinoma of the fundus. The inverted uterus was treated by the application of thirteen needles containing radium bromide so as to irridate the whole of the malignant tissue equally. The uterus was removed by abdominal panhysterectomy, and the patient did well.

CLINICAL MANIFESTATIONS OF CEREBRAL TUMOUR.

THE opening meeting of the Royal Medico-Chirurgical Society of Glasgow was held on October 5th, when an address was delivered by Dr. GORDON M. HOLMES, entitled "The clinical manifestations of cerebral tumour."

Employing the term "tumour" in its widest sense, Dr. HOLMES said that cerebral tumours were much more common than they were generally believed to be. The clinical manifestations, which were often complex, and which might vary from time to time in form and severity, might be considered under two headings: (1) general, due to increased intracranial pressure, on which the diagnosis of the actual presence of a tumour depended; and (2) local, due to the pressure of the tumour on the neighbouring parts, on which the diagnosis of the site of the tumour depended. After referring to the causes of the increase in intracranial pressure, Dr. HOLMES considered in detail the cardinal symptoms arising therefrom—namely, headache, vomiting, and optic neuritis or papilloedema. The headache, due to congestion of the vessels, occurred as a rule in the morning and was usually referred to the frontal region—"behind the eyes"—though occasionally, as in cerebellar tumours, the pain was chiefly occipital. The vomiting, which bore no relation to the ingestion of food or to the condition of the stomach, was frequently accompanied or preceded by nausea (contrary to what was usually stated in textbooks) and was almost invariably associated with the morning headache. Optic neuritis, a most valuable positive sign and generally present in cerebellar and mid-brain tumours, was unfortunately often absent in early cases, especially in tumours in the region of the pons and basal ganglia. It was important to distinguish between true papilloedema and such conditions as neuro-retinitis of arterial or renal disease, or pseudo-papillitis. Of the remaining general symptoms, a slow pulse rate was not of great significance; true vertigo, usually a local symptom in tumours of the posterior fossa of the skull, was comparatively rare; mental symptoms, though important, were often misinterpreted and attributed to primary mental disease or general paralysis of the insane. While none of these general symptoms was constant, and none, except, perhaps, papilloedema, was pathognomonic, they were rarely absent altogether, except in such cases as a slow-growing tumour where the intracranial pressure was not increased or the brain had time to adapt itself to the increased pressure, or in cases where there was no interference with the circulation of cerebro-spinal fluid. With regard to the local symptoms of cerebral tumour, which might take the form of either paralytic or irritative phenomena, the important points to note were the slow onset and the progressive and extending development to surrounding areas. Sudden and irregular exacerbation or diminution in the severity of the symptoms, both general and local, were not uncommon and were due to such causes as circulatory disturbances, interference with the flow of cerebro-spinal fluid, inflammation and oedema, haemorrhages, central softening of the tumour, and cyst formation. Very rarely there was a history of an acute or subacute onset—for example, in some of the cases of the infective granulomata—but careful questioning usually elicited slight premonitory symptoms.

Dr. Gordon Holmes then discussed briefly the differential diagnosis, including such conditions as cerebral degenerations, general paralysis of the insane, hydrocephalus, renal disease, and arterio-sclerotic disease. Of the accessory aids to diagnosis, such as radiography, ventrilography, or pneumography, and lumbar puncture, little real help was to be expected, and, in some cases, such information as they did provide was not commensurate with the risk of their employment. A decompression operation, while it relieved acute symptoms, often prevented any further chance of accurate localization, which, after all, was secondary only to the early recognition of its clinical manifestations in the diagnosis and treatment of cerebral tumour.

INSULIN IN ADVANCED DIABETES.

A MEETING of the Brighton and Sussex Medico-Chirurgical Society was held on October 4th, 1923, with Dr. ELIOT CURWEN, President, in the chair, when Dr. R. SANDERSON read a paper on the effect of insulin in advanced cases of diabetes. He said that whatever may be the benefits conferred upon the diabetic by insulin, there seemed little doubt that it bade fair to bring many practitioners to a premature grave, so multitudinous, bewildering, and worrying were the problems involved. It was in the hope of minimizing the extent of this fatal toll upon his fellow men that Dr. Sanderson gave his experiences. We were, he said, to a large extent ignorant of the biochemistry of the metabolism of ingested food; we knew more than we did a few years ago, but there were large gaps in our knowledge. We knew that diabetes mellitus was not a disease connected with carbohydrate metabolism only, though this was its most obvious symptom, but that it was concerned also with the defective metabolism both of fats and proteins; it was a disease affecting metabolism generally. Dr. Sanderson then quoted Professor Macleod on the point that the metabolism of carbohydrates did not proceed independently, for in the chain of processes which preceded the final oxidation of glucose some substance was formed which was also intermediary in the metabolism of the other proximate principles of food—namely, fats and proteins. The metabolism of the three proximate principles therefore was closely interwoven so that when anything occurred to interfere with that of one of them some change was likely to occur in the others. The paper was discussed by Dr. BROADBENT.

Treatment of Glaucoma.

Mr. H. TAYLOR read a paper on the operative treatment of glaucoma. He first showed several cases of corneo-scleral trephining for chronic glaucoma. In one case iridectomy had been done on the right eye and the left eye had been trephined. In the right eye the iris was included in the wound, but the tension was still *plus*. There was a bleb in the left eye, but no rise of tension. In his opinion iridectomy was only successful when a piece of iris was prolapsed in the wound (iris inclusion) which might act as a drain. He divided chronic glaucoma into two classes: (1) when a small amount of drainage only was necessary to re-establish equilibrum; and (2) where a considerable amount of drainage only would suffice. In the first class iris inclusion might be all that was required; in the second class sufficient drainage could only be procured by trephining. The bleb over the trephine hole was undoubtedly objectionable, but it was doubtful if it could be avoided. If the case trephined was in the first class no bleb would form, but in the second it probably would. Therefore the bleb was not due to the operation, but to the amount of fluid which must drain away. He had been unable to decide before operation in which category a case could be placed. Iridectomy, even if the iris was included, might not function in the first class and most certainly would not in the second class. Therefore, from all points of view he considered that sclero-corneal trephining should always be practised. Further, he was firmly of opinion that if chronic glaucoma was once diagnosed no time should be wasted on palliative treatment, but an operation should be performed as soon as possible. Lieut.-Colonel HERBERT, Dr. BRYANT, and Dr. DALDY took part in the subsequent discussion.

Dr. GALT showed microscopical slides of *Aspergillus niger*, ringworm in hairs, normal pancreas, pancreas from an advanced case of diabetes in an adult and also in a child aged 9. Mr. A. J. HUTCHISON gave details with reference to the slide of *Aspergillus niger*.

SURGERY OF THE LARGE BOWEL.

THE annual meeting of the London Association of the Medical Women's Federation was held on October 8th at the Elizabeth Garrett Anderson Hospital, when Dr. LOUISA MARTINDALE, the retiring president, vacated the chair to her successor, Miss M. M. CHADBURN.

Miss Chadburn first discussed briefly some of the points raised by Sir Humphry Rolleston in his recent address at the London School of Medicine for Women, and then proceeded to give an address on the surgery of the large bowel. She surveyed the diseases of the large bowel which had fallen to her care during the years 1905-22, excluding pressure effects on the bowel from outside, cases of adhesions and their sequelae, diseases of the appendix, haemorrhoids, fissures, fistulae, and complete perineal tears. It had been found difficult to trace cases, but it was encouraging to find a few cases of carcinoma of the rectum, sigmoid, colon, and caecum living as long as eight to fourteen years after radical excision. In regard to the incidence of disease in the large bowel, the great preponderance of malignant disease was noteworthy; of the malignant cases the large proportion of cases were inoperable when first seen, and the advanced stage of those that were operable, and the rarity of the discovery of malignant disease of the large bowel at an early stage, were striking points. Of 181 consecutive cases 121 were carcinomata, of which 62 were operable when first seen. Miss Chadburn did not believe that any more radical operation than the abdomino-perineal excision would be discovered for rectal carcinoma. She considered that it was now possible to say that operations on the large bowel were as radical as was physically possible. Advance must be sought either in obtaining cases earlier for treatment, in some treatment other than operative, or in prevention. Earlier diagnosis seemed the most hopeful means of improving results, but unfortunately the onset was insidious. Miss Chadburn concluded that operations for carcinoma in the large bowel were borne well, especially in early cases; those cases that died from operation in her series were almost without exception very advanced cases. A large proportion of them had more than the affected bowel removed: for example, in three cases she had to remove the uterus and part of the vagina, in one the left ovary and tube and an adherent portion of small intestine, in order to remove a rectal growth, and in another case the left kidney and ureter because of the involvement of the ureter in a growth of the sigmoid colon. As regards technique, she performed lateral anastomosis of the bowel or an end-to-side anastomosis as being safer, easier, and less likely to contract than an end-to-end anastomosis. For rectal carcinoma an abdomino-perineal excision, if possible, was her operation of election, with or without colostomy. Where the vessels of the sigmoid loop and the position of the growth allowed, she brought the sigmoid to the anus, leaving the sphincter after incising it to secure drainage of the bowel. These patients had a very fair and in some cases a very good control. A perineal excision, though not the operation of election, could be a very free one if approached by the vaginal route. Miss Chadburn did not think there was ever any advantage in taking away a portion of the sacrum; as good a clearance of glands could be obtained without doing so, but not nearly so good a clearance as by the abdomino-perineal route, where the inferior mesenteric artery and the glands on it were removed at the highest possible point.

Reviews.

PSYCHOLOGICAL TYPES.

PROFESSOR C. G. JUNG has written an important work entitled *Psychological Types, or the Psychology of Individuation*,[1] which he describes as the fruit of nearly twenty years' work in the domain of practical psychology. Psychiatrists who gained inspiration from his earlier work on dementia praecox may perhaps regret that the author did not confine his attention to those clinical studies which promised so much, but the trend of his investigations into delusional states, and his own natural bent, have led him, perhaps inevitably, to apply his empirically gained knowledge to the problems of life as a whole. Some readers may feel that his outlook is philosophical rather than scientific; but whether this be so or not, his knowledge of human nature has not been evolved from the depths of an armchair, after the manner of some philosophers, but is based upon an intimate knowledge of the inner mental life of all sorts and conditions of men. This experience of human nature, together with a wide knowledge of human aspirations as expressed in ancient and modern literature, have enabled him to produce a highly original work which will be read with advantage by those who interest themselves in the problems of life and personality.

Though we are all aware of the fact of individuality, we should find it difficult to define the differences between one individual and another. The academic psychologist has left the matter severely alone, and it is to the dramatist, novelist, or biographer to whom we turn for convincing pictures of the various human types. Excellent character studies of abnormal persons have been presented by medical psychologists; but the most comprehensive attempt at psychological classification of personality types is undoubtedly that evolved by Jung in the book before us. He has found that humanity can be divided into two contrasting types, which he terms *introverted* and *extraverted* respectively. The destinies of the extravert are conditioned more by external objects, and the introvert more by his inner self—by his subject. The interest flows outward in the one case, inward in the other. To quote from the author:

"If a man so thinks, feels and acts, in a word so lives, as to correspond directly with objective conditions and their claims, whether in a good sense or ill, he is extraverted," but in the introvert, "the subject is and remains the centre of every

[1] *Psychological Types, or the Psychology of Individuation.* By C. G. Jung. Translated by H. Godwin Baynes, M.B., B.Ch.Cantab. London: Kegan Paul, Trench, Trübner and Co. 1923. (Demy 8vo, pp. xxii+654. 25s. net.)

interest. It looks, one might say, as though all the life-energy were ultimately seeking the subject, thus offering a constant hindrance to any overpowering influence on the part of the object."

In a series of fascinating chapters Jung shows how these two opposed types have influenced religious thought, art, science, and philosophy; he shows also how they have been recognized by thinkers under different names. Heine's enthusiastic mystical Platonic natures, and the practical, ordering Aristotelian natures; Blake's devouring and prolific types; James's tender-minded and tough-minded; Nietzsche's fundamental pair of opposites—the Apollonian and Dionysian; Oswald's classic and romantic types; and Jordan's more impassioned and less impassioned—all these correspond more or less closely to the introvert and extravert. Individuals in each of these groups naturally show considerable differences, and Jung divides the introverted and extraverted types into thinking, feeling, sensation, and intuitive function-types according to which of these functions has the principal share in an individual's orientation to life. This method of descrimination undoubtedly provides a useful scheme in which to include the infinite variations of attitude, and the outline given of the various types is obviously the work of an observer of profound psychological insight.

With these two contrasting types as a basis Jung proceeds to develop his psychological views. His psychology is complex and his exposition of it sometimes a little obscure; it has but few points of contact with the psychology of the textbooks, and the author frankly repudiates the possibility of understanding life or personality from the mechanistic standpoint. There is much in this book inviting comment, but we may perhaps remark more especially upon the complete inability of the introvert and extravert to understand or appreciate one another. James thoroughly appreciated the significance of this "clash of temperaments" in the sphere of philosophy; and in describing the "tender-minded" rationalist and the "tough-minded" empiricist he recognized the prejudices which are mutually cherished by the two types: "They have a low opinion of each other. . . . the tough think of the tender as sentimentalists and soft-heads. The tender feel the tough to be unrefined, callous and brutal. Each type believes the other to be inferior to itself." It is largely Jung's aim to show that "though strife and misunderstandings are, assuredly, constant requisites for the trago-comedy of human life . . . a basis for the adjustment of conflicting views could be found in the recognition of types of attitude, not however of the mere existence of these types, but also of the fact that every man is so imprisoned in his type that he is simply incapable of a complete understanding of another standpoint." It is not only in the high altitudes of philosophic thought that misunderstandings arise, however, but in our daily contacts with our fellows. Jung emphazises this point in simple language in commenting upon Jordan's description of the extraverted man. He points out that the pitiless severity of Jordan's description shows him to be on the side of the introvert, and then in an illuminating passage indicates how such a lack of benevolence arises. This passage we will quote in full, because it reveals what is Jung's basic psychological position:

> "It is certainly true that the extravert, if he has nothing to say, may find it necessary for a window to be opened or shut. But who has remarked it? Who is essentially struck by it? Only the man who is trying to give an account of the possible grounds and intentions of such an action, one therefore who reflects, dissects and reconstructs, while for everyone else this little stir is altogether dissolved in the general bustle of life, without offering an invitation to any ulterior deduction. But it is just in this way that the psychology of the extravert reveals itself: it belongs to the occurrences of daily human life, and it signifies nothing more, either above or below. But the man who reflects, sees further and—as far as the actual life is concerned—sees crooked, although his vision is sound enough as regards the unconscious background. He does not see the positive man, but only his *shadow*. And the shadow admits the justice of the criticism, to the prejudice of the conscious positive human being."

Here would seem to be an important truth on which we should do well to ponder. When the extravert opens or shuts the window we judge the man wrongly and fail to understand him if we say, "He always likes to be in the limelight" (unconscious motive); our judgement is more true if we say, "He always does the right thing" (conscious purpose).

Jung's teaching must be understood as a reaction against the present tendency of psychologists to preoccupy themselves with unconscious motives and to ignore the existence of conscious aims. His primary classification of humanity into types, differentiated by the direction of their interest, gives a new orientation to psychology; it deflects the attention from origins to aims, from causes to ends. Jung points out that in daily life we instinctively view a man's action from the purposive standpoint; we are not interested so much in the motives or causes of an action, but rather in what the man intends by it, what are his aims and purposes, what he hopes to achieve by it. He feels that a scientific psychology must take this fact into account and not rely exclusively on the causal standpoint. Professor J. B. Baillie has picturesquely said that in the light of science "man is viewed as the most prominent marionette in the mechanism of nature." This is not Jung's view. For him man is not a mere puppet under the control of forces alien to himself, but a living subject, working out his own destinies according to the limitations of his peculiar type.

H. DEVINE.

DISEASES OF RECTUM AND COLON.

MR. LOCKHART-MUMMERY has done well in revising his books on diseases of the rectum and of the colon respectively to combine them into one volume under the title *Diseases of the Rectum and Colon*.[2] An experience of some twenty years has brought the author to the not very surprising conclusion that the study of one part of the large bowel cannot be dissociated from that of the rest. He refers to the change which has come over this branch of surgery and expresses the opinion that disease of the large bowel is becoming more common and is therefore assuming greater importance. The reason is, he thinks, in the main dietetic. The highly elaborate preparation of foodstuffs has had the effect of reducing the indigestible residue to a minimum, with the result that the normal stimulus to peristalsis and digestion is diminished, especially in people of sedentary habits. In the more primitive races, whose food contains a greater proportion of undigestible cellulose, many of these ills do not arise. The author devotes a chapter to the physiology and to the bacteriology of the large intestine, and it is interesting to find here, as well as elsewhere, experimental work quoted in support of his conclusions. In discussing the vexed question of the function of the colon he says that the arguments brought forward to support the view that it is a useless and effete organ are far from convincing. One of the results of complete colectomy is to upset the fluid economy of the body. Patients who have undergone this mutilation have to take more fluid and are liable to suffer from diarrhoea after each meal. In dealing with the question of occlusion of the bowel certain experiments are quoted. The author states dogmatically that accumulation of faeces will occur in any loop, either proximal or distal to an anastomosis, and that an abscess will eventually form. The condition is not compatible with good health unless a fistula is left communicating with the excluded loop. Distension of the colon, he considers, results from fermentative processes in the faeces. The gas liberated is normally absorbed and carried away in the venous stream. Therefore to prevent meteorism either the bowel must be cleared or substances introduced into it to prevent fermentation. Post-operative ileus he holds to be due to microbic infection of the peritoneum. Proper diet and cleansing of the colon are the only means of combating it. Morphine has no specific effect.

Enteroptosis, he considers, is due mainly to weakened abdominal walls, with the consequent venous stasis due to lowered intra-abdominal pressure. For this condition he performs lateral anastomosis between the most dependent part of the transverse colon and the upper end of the

[2] *Diseases of the Rectum and Colon and their Surgical Treatment.* By P. Lockhart-Mummery, F.R.C.S.Eng., M.A., M.B., B.Ch.Cantab. London: Baillière, Tindall and Cox. 1923. (Demy 8vo, pp. x + 872; 215 figures, 5 plates. 25s. net.)

rectum; his object is to obviate the effect of gravity in the loop passing up to the splenic angle, and so to get rid of the symptoms rather than deal with the ptosis.

The various forms of suspension operations, so popular of late, he condemns as unsound in principle. The mesenteries, he holds, are not suspensory ligaments, and it is no use hitching them up and expecting the stitches to withstand the movements of the bowel and support the continual drag of the loaded colon, where the intra-abdominal pressure is reduced. The discussion of intestinal stasis and chronic constipation occupies a good deal of space; of the latter, two types, obstructive and atonic, are recognized. Contributory factors are diet, sedentary habits, the mechanical disadvantage of the colon in the erect attitude, and weakness of the abdominal wall. As to the pathology of stasis, the views of the mechanical school, headed by Sir Arbuthnot Lane, and of the opposite camp, under Professor Adami, are fully discussed; the conclusions reached are that the mechanical view is in itself no longer tenable, and that the condition is more probably due to some neuro-muscular inco-ordination of the colon wall—the view supported by Sir Arthur Keith.

All the surgical lesions of the colon and rectum are taken seriatim and dealt with in separate chapters. They are discussed with due attention to detail, cases are quoted to illustrate special points, and each section bears the mark of practical experience. The literature about diverticulitis, for instance, which has grown so rapidly in recent years, has been thoroughly sifted. In the treatment of this condition the author advises colostomy followed by excision later, after there has been plenty of time for the inflammation to subside. In the course of the discussion of malignant disease of the rectum and colon some encouraging results are recorded. For the years 1915-1921 the author's operative mortality for perineal excision of the rectum in 109 cases was a shade over 8 per cent.; of 36 patients operated on in 1915-1917, 17 were alive and well five years after the operation (47 per cent.). The abdomino-perineal operation, although theoretically ideal, has a high operative mortality, varying from 25 per cent. to 40 per cent. It is a pity that reliable statistics as regards recurrence after this operation have not been included in the text to round off the comparison between the two operations.

Many of the finer points of operative technique are discussed, especially the various methods of colon anastomosis, and their relation to the blood supply. This book should enjoy a wide popularity among all interested in the practice of surgery, for its contents are as valuable to the practitioner in the country as they are to the surgeon in a city.

GASTRO-ENTEROPTOSIS.

DR. COFFEY almost apologizes for publishing his monograph on *Gastro-enteroptosis*.[3] Most of his friends advised him against appearing in print, but a chance meeting with Sir Berkeley Moynihan and the encouragement received from him made Dr. Coffey change his mind, and the book has appeared with an appreciatory note by Sir Berkeley, who is described by the author as "maintaining an attitude of benevolent and dignified tolerance." The author's purpose has been to assemble all the important facts on this subject and to co-ordinate them into a clinical syndrome in the hope that it may form a basis for future investigation. The book should therefore command the attention and respect of all surgeons interested in abdominal surgery, whatever their own views may be, for the problem attacked is brimful of debatable matter, has given rise to highly conflicting opinions, and has been the cause of much harmful surgery. The author quotes and discusses the work of many surgeons, not only that of American, but that of Sir Arbuthnot Lane, Walton, Waugh, and Wilkie in this country, and of the Scandinavian surgeon Rovsing.

Detailed descriptions of the relations of the abdominal viscera are given and discussed from many points of view. For instance, there are chapters on the structure of the abdominal wall, the shape of the abdominal cavity and its suspensory ligaments, intra-abdominal and intra-visceral pressure, the comparative anatomy and physiology of the intestinal tract, and defects in pre-natal peritoneal development. Constipation and intestinal stasis are fully discussed. The author considers that peritoneal bands may be either congenital or inflammatory, and that the bands due to the "crystallization of the lines of force," described by Lane, develop for the purpose of holding up bowel not normally fixed. Ptosis, he holds, may be congenital or acquired. The congenital variety, which he classifies into general ptosis, right-sided ptosis, and mid-line ptosis, is attributed to deficient pre-natal fusion between the peritoneal coverings of the colon of the posterior parietal peritoneum. The chain of events culminating in ptosis, he considers, are as follows: in adolescence the unfixed colon begins to slide through the psoas outlet, dragging on the viscera and causing indigestion. This in turn induces loss of flesh, diminishes muscular tone and intra-abdominal pressure. Gas accumulates and the intestines dilate. Nutrition is further impaired, fat is reduced and the viscera sink lower. Secondary changes now occur. The lumbar spine becomes relatively straight, thus further reducing the efficiency of the kidney shelf, and the upper dorsal spine acquires a compensatory kyphosis, leading to narrowing of the upper abdomen. Acquired ptosis occurs in the mid-line and involves one or more organs; the relations of these organs to the normal fixed points are changed chiefly at the hepatic and splenic flexures, so that kinking and obstruction are apt to take place at these points. This type is further subdivided into virginal and maternal. Dr. Coffey says that probably 75 per cent. of patients who thus suffer can be made fairly comfortable by medical means—namely, rest with forced feeding for the deposition of fat, postural treatment, exercises, bandaging, and regulation of the bowels without cathartics. Of the remainder 15 per cent. can be made comfortable by a physician of special experience; the remaining 10 per cent. will require surgical treatment.

For generalized congenital ptosis the author performs a so-called hammock operation, whereby the whole colon is anchored to the parietal peritoneum. In extreme cases he plicates the abdominal wall For right-sided ptosis he recommends removal of the appendix and fixation of the right kidney, if necessary with plication of the colon and shortening of the meso-caecum, fastening it to the lateral peritoneum. He also quotes Waugh's operation, whereby the lateral parietal peritoneum is incised and stitched to the anterior longitudinal band, the colon resting in the bed thus prepared for it.

For acquired mid-line ptosis he recommends Rovsing's so-called operation of gastro-coloptosis. Duodenal arterio-mesenteric ileus, he considers, is due to the drag on the superior mesenteric artery by the weight of that portion of the intestine which it supplies. He quotes Wilkie's work on the subject and recommends duodeno-jejunostomy. For the surgical treatment of chronic intestinal stasis he suggests an alternative to complete colectomy. Dr. Coffey performs an ileostomy, in which a loop of ileum, which may subsequently be closed, is brought to the surface. Through this fistula the colon is irrigated. If the disease persists then there is no need to remove the colon, but if the symptoms are relieved the sigmoid colon is divided, the proximal end is brought to the surface, and the terminal ileum is diverted into the pelvic colon, thus leaving the patient with two fistulae. He considers this preferable to colectomy.

The author concludes by stating that there is no part of his surgical work which has been more satisfactory than that pertaining to the treatment of ptosis.

MEDICINE IN INDIA.

SIR PATRICK HEHIR, in his book *The Medical Profession in India*,[4] states that Western medicine in India is at present going through a critical stage, likely seriously to affect its

[3] *Gastro-enteroptosis.* By Robert C. Coffey, M.D., F.A.C.S. Surgical Monographs. Under the editorial supervision of Dean Lewis, A.B., M.D., Eugene H. Pool, A.B., M.D., and Arthur W. Elthing, A.B., M.D. New York and London: D. Appleton and Co. 1923. (Sup. roy. 8vo, pp. xx + 303; 205 figures. Issued in sets of five volumes only, price £5 5s. the set).

[4] *The Medical Profession in India.* By Major-General Sir Patrick Hehir, K.C.I.E., C.B., C.M.G., I.M.S. London: H. Frowde, and Hodder and Stoughton. (Demy 8vo, pp. 139. 7s. 6d. net.)

future. One of the chief causes of the crisis is that the Indian Medical Service has lost its attraction for young graduates of the home medical schools; the rapid Indianization of that service following the Reforms Scheme has led to uncertainty regarding the future and to the filling of the professorial chairs of the medical colleges and college hospitals, and many of the higher civil medical appointments, by Indians not belonging to the service. The provincial legislatures convey the impression that the demise of the I.M.S. would not disturb their peace of mind; one province has declared that it does not want the services of any I.M.S. officers. The disappearance of the Europeans of the I.M.S. would, the author considers, be a calamity to India.

The profession in India, Sir Patrick Hehir says, consists of three groups—the medical services of Government, independent medical practitioners, and those who practise the ancient systems. The population of India is mainly dependent for medical relief on the last two groups. Leaving out the holders of English medical degrees, and the small number of other men employed on special estates, there is in Bengal one medical graduate or qualified practitioner of the assistant surgeon class for every 2,300 persons in Calcutta, and only one for every 181,000 persons outside Calcutta. The same conditions prevail in other parts of India, although to a less pronounced degree. The practitioners of the ancient systems greatly outnumber those who practise Western medicine; many thousands practise these systems, who, whilst they do some good, also do much harm. The talents of these practitioners vary within extreme limits from being illiterate impostors and empirics, to persons versed in the ancient systems and often possessing a smattering of Western medicine. The author believes that the standard of medical education in India will fall in direct ratio to the extent to which European I.M.S. officers are removed from the teaching appointments. He holds the same view regarding the superior posts in the civil departments—the fewer held by European I.M.S. officers, the lower will be the standard of treatment in the civil population. The I.M.S. has done a great deal towards elevating the practice of medicine by Indians during the last seventy years; but to raise standards in a whole country is the work of many generations. The lower type of medical man who fails to get into other branches of the medical services in India is not likely to raise or even to maintain the standard. Sir Patrick Hehir surveys the whole field of medical education and practice in India, and states in detail the changes he considers necessary in the interests of Indians themselves.

WHAT THE INSURANCE SYSTEM MIGHT BE.

IN *The Old Doctor*[5] Dr. F. G. LAYTON has produced a novel with a purpose. With grim accuracy and subtle humour life in the "medical underworld" is portrayed as it existed in pre-war and pre-Insurance Act days, with the everlasting struggle of the conscientious practitioner to improve the seamy side of general practice alike for his patient, his colleagues, and his art.

The story is told with an intimacy of detail which is at times almost startling in its directness. To those old enough to have passed through its earlier period it will vividly recall many memories, while for the younger generation, who knew not such times, it will possess a fascination in that it contains a comparative history of their inheritance. The theme is developed mainly in dialogue, the crispness of which never falters, and centres round the personality of the "Old Doctor"—Luke Denison. The reader learns to realize what a power such men were in maintaining the honour of their calling amidst all the evils for which the old club system and the sixpenny non-visiting doctor were responsible. The ever-ready helping hand to guide the struggling Dr. Dix in his early career through the temptations to fall from the high ideals of his Hippocratic oath, which the existence of such conditions fostered, is well brought out, and the obvious outcome is seen in the welcome given to the Insurance Act by men who hailed it as the deliverance of the honest practitioner from the thraldom of hopeless inability to do the best for his patient, while rescuing the "Back Street" poor of such Black Country towns as Wonstone from the crippling anxiety about fees to meet which there never was, and never would be, any money.

The "Old Doctor" warmly welcomed the Insurance Act. "We shall be able," he exclaimed, "to see people just as often as we please without having to worry about charges," and continued, "Poor people will be able to be ill as long as they like and never a thought of a doctor's bill to frighten them." Beyond and above such present-day practical considerations were his visions of what the insurance system of the future would lead to in the ability to estimate the beginnings of ill health and so provide for the larger issues of preventive medicine.

The author is peculiarly happy in depicting the social aspect of professional life in such a town. Since Ian Maclaren's old Highland Dr. Maclure in *Beside the Bonnie Brier Bush*, there has scarcely been so masterly a portrait of the best type of general practitioner as is portrayed in Luke Denison, and were the book read widely, as it deserves to be, it would do much to dispel the misconceptions, too rife among those who have never stayed beneath a doctor's roof, as to the kind of life the average medical man leads. The realization of such a thing would go far to remove from the official mind much that now hampers the just estimation of the value of services honestly given in a persistent endeavour to push forward the whole science and art of medicine.

The author maintains a never-flagging interest, and has succeeded in making his characters "live." His literary gifts thus enable him to draw a vivid picture of all that led up to the inception and carrying through of the Insurance Act as a measure of relief from the crippling influence of club practice, and deliverance from such men as Drs. Miggs and MacFad, who will rank in fiction with the portraits drawn by Dickens and Thackeray. There can be no better summing up of the book than is provided by the last sentence, in which Luke Denison quotes from the Hippocratic oath: "'Purely and holily I will keep guard over my life and my art . . .' That's the scheme." To all and sundry, professional and lay, this book cannot but appeal, and it may interest readers to know that the author is generously devoting all profits to charity.

[5] *The Old Doctor*. By Frank G. Layton, M.R.C.S., L.R.C.P. Birmingham: Cornish Bros., Ltd. 1923. (Cr. 8vo, pp. 170. 4s. 6d. net.)

NOTES ON BOOKS.

THE little book on *Natural Religion*,[6] by Dr. JOSEPH S. BOLTON of Nottingham, is well worth reading. It lays claim to no great erudition and to no great originality. But it is written—was written, for the work is posthumous—by a man greatly in earnest, believing in his thesis, in himself, and in the value of his message. His work is so thoroughly unorthodox that it can only be criticized by a non-theologian. During the war the writer of this notice remembers a medical officer who was asked, somewhat inquisitorially, by a High Church Anglican padre, to what denomination he belonged. He replied that he was a U.C.; next day the cleric returned to the charge saying that none of his Presbyterian brethren could identify the "body." Whereupon the M.O. explained that it stood for "Unattached Christian," and the padre went his way, muttering to himself. Dr. Bolton might quite well have called his book "The Religion of an Unattached Christian," for, while his pages are full of the teaching of the Founder of our Faith, he has no use for prelates, priests, or a paid clergy of any stamp whatsoever: creeds, precedents, symbols are all thrown overboard. Natural religion is defined as the spirit of God in the soul of man, directing and controlling his conduct. "It reveals itself as an appreciation of God, strictly comparable to the appreciation of music or poetry or art." For, as a musician is a man who appreciates and enjoys music, so is "a saint a man who appreciates and enjoys God, and demonstrates God to his fellows." It is a thoughtful book written by a cultured and kindly-hearted man who had evidently great belief in his fellow men and their inherent capacity to attain to yet higher things.

[6] *Natural Religion: The Ultimate Religion of Mankind*. By J. S. Bolton, M.D. London: Kegan Paul, Trench, Trübner, and Co., Ltd. 1923. (Cr. 8vo, pp. viii + 120. 3s. 6d. net.)

THE firm, L'Art Ancien S.A., of Lugano, Switzerland, has issued an elaborate illustrated catalogue of early books and manuscripts on medicine and the natural and physical sciences. The prices are stated in Swiss francs. Books will be sent on approval to customers.

British Medical Journal.

SATURDAY, OCTOBER 27TH, 1923.

THE INSURANCE CRISIS.

In the SUPPLEMENT this week we publish a full account of the Panel Conference, containing a verbatim report of the statement which the Chairman of the Insurance Acts Committee made to the representatives. This statement was ordered to be sent to every insurance practitioner, and when it is read it should make the main issues clear and provide a view of the situation which may well be put to members of Parliament and others who are interested. This is very necessary, for many of the articles and statements in the lay press during the last fortnight—even some attributed to doctors themselves—appear to indicate a considerable degree of inaccuracy and confusion of thought.

As Dr. Brackenbury showed in his forcible and lucid address, there are at the least three important points that it seems necessary to emphasize. The first of these is that the present action by the profession is being taken not against what is sometimes spoken of as the "panel system" as such, but in order to avert the danger of a debasement of that system. The provision of medical attendance and treatment by means of a national health insurance system has been declared by both the Conference of Local Medical and Panel Committees and the Representative Body of the British Medical Association to deserve the united support of the profession for its continuance and improvement. No important body of practitioners, however, would consent to become or remain members of a service the terms and conditions of which militated against good professional work being done or tended to bring about a less satisfactory standard of attendance among the industrial population than among those of other classes. Almost continuously since 1913, in spite of the very adverse influences of war and unemployment, practical experience has led to a steady improvement of medical benefit under the system which began to operate in that year. Further important improvements have been suggested or agreed to by the Panel Committees and the Insurance Acts Committee, to become operative at the beginning of next year. The effect of these improvements would be nullified by any such drastic reduction of remuneration as that proposed by the Minister of Health under the pressure of the Approved Societies. It would be nullified, too, by any such additional obligations as those societies are still urging the Ministry to impose upon insurance practitioners, restricting their liberty to undertake legitimate private work, allowing complaints to be made against them by society agents even contrary to the wishes of the patients themselves, and making requirements with regard to medical certificates such as are unheard of in any other comparable sphere. Neither the huckstering spirit nor the low ideals of the societies are tolerable to a profession which has wider notions as to what a national health service ought to be and a greater regard for the well-being of the wage-earners as patients. The medical profession will continue to fight strenuously for the maintenance of a health insurance service worthy alike of the nation and of itself.

In the next place the present action of the profession is not against the Friendly Societies as such in their own sphere, but against their usurpation of a place in the system which is not properly, and was never intended to be, theirs. As dispensers of cash payments in incapacitating sickness or disablement, of maternity benefit, and of some additional benefits, they serve a very useful purpose, and their work may be of great value to the community. There are ways in which they can be of much help both to patients and to doctors. Their diversity is not necessarily a drawback; but the large numbers of societies and branches, the complexity of their administration, the complicated organization of some of them, and the very small membership of others, are certainly disadvantageous. It is probable that the establishment of suitably constituted committees, comparable to Medical Service Subcommittees, to which complaints as to their administration of sickness and other benefits might be referred for investigation and public comment, would result in the restriction of irregularities and negligences; and it is certain that their power of veto over the use of national funds and their extending administration of such additional benefits as are obviously if not legally "of the nature of medical benefit," ought to cease if either the national Treasury or the medical profession is to maintain independence. But the Friendly Societies in their own place and the profession in its own place are alike integral parts of the insurance service, and there is no fundamental reason why they should not co-operate for the national good.

The third point to make clear is that the protest of the profession against a drastic reduction of the insurance capitation fee is not a demand for any further contribution from the taxpayer. The claim is that the remuneration of insurance practitioners, ascertained on its merits, should be a first charge on the National Health Insurance Fund, and that this Fund is, and is likely to continue to be, in a position to bear it. This claim as to the substantial stability of the Fund, in the aggregate, is established by the report of experts after full investigation; it has not been controverted by the Ministry; and it is allowed by some of the most astute officials of the Approved Societies themselves. Payments out of the Fund are, according to the statutory provision, supplemented to the extent of two-ninths from Government grants; but the same proportionate supplement out of the taxpayer's pocket has to be made whatever be the purpose to which the payments are directed. Any reduction of the capitation fee, therefore, does not advantage the taxpayer at all.

These three negative points should be borne in mind. The medical profession no doubt realizes them, but it seems needful to impress them on the public and on Parliament. The more clearly they are understood the more valuable will be the increasing support already being given to the profession by the press and public opinion. But the profession must rise, and we believe has already risen, to the heights of its own opportunity. It has an active and efficient organization and experienced and able leaders, who have not hesitated to give a strong lead. Never were its members so united in their aims and their determination. The Minister of Health has left only the one way open for professional action. It behoves every insurance practitioner who has not already sent in his resignation from the service to do so without fail and at once. Such a demonstration of professional feeling and professional power will be in itself

a victory, and if wisdom and moderation are shown in the situation that will then arise, the insured population, the national health, and the credit of the profession will benefit alike.

THE BACTERIOLOGY OF MEASLES AND SCARLET FEVER.

THE two common infectious diseases, measles and scarlet fever, the etiology of each of which has always been disputed, are now being studied by laboratory workers in Europe and America, employing all the latest refinements of bacteriological technique. These researches have thrown new light on the early stages of these infections; they have led to the formulation of some original and plausible propositions; and, though not accompanied as yet by any decisive discoveries, they have afforded fresh evidence incriminating certain organisms long under suspicion, evidence which time will test and on which experience must judicate.

The researches carried out on measles, for instance, corroborate the view that this disease owes its origin to the invasion of the body by an ultramicroscopic virus. We have received from Professor G. Caronia of Rome a paper on the etiology of measles,[1] in which he announces that the micro-organism he considers responsible for this disease passes through an ultramicroscopic phase in the cycle of its development, but later appears as a small diplococcus when cultivated under special anaerobic conditions on a special medium, the preparation of which has not, so far as we can ascertain, been described. He has obtained cultures of this micro-organism from the blood, bone marrow, cerebro-spinal fluid, and naso-pharyngeal secretions of children in the prodromal and eruptive phases of measles; the blood of such patients showed specific antibodies against the organism recovered in cultures. It is stated that young rabbits inoculated intravenously with large amounts of blood from measles patients developed a clinical picture resembling human measles, and the same organism was recovered from their blood. He inoculated healthy children with inactivated or attenuated cultures and conferred on them immunity to measles; he inoculated three healthy children with large and repeated doses of recent cultures, and induced a typical but attenuated form of measles, the eruption being brief but universal, and accompanied by high fever. In these patients the serological reactions were positive, and the micro-organism could be cultivated from the blood and from the filtrates of the secretions from the nose and throat.

Turning to scarlet fever, we may recall that in 1921 Dr. Mervyn Gordon, in his serological study of haemolytic streptococci, published in this JOURNAL,[2] stated that there are three distinct types of haemolytic streptococci which can be differentiated by agglutination absorption tests, and that one of them (Gordon's Type III) is found chiefly in the tonsils and fauces of scarlet fever patients. This organism, *Streptococcus scarlatinae*, is quite distinct from the more common haemolytic *Streptococcus pyogenes*. Bliss[3] had found haemolytic streptococci in 100 per cent. of scarlatinal throats in the first week, and noted that immune serums prepared from scarlatinal streptococci agglutinated more than 80 per cent. of strains isolated from scarlatinal throats. These scarlatina cocci were not agglutinated by serums prepared from other streptococci. Tunnicliff[4] also isolated haemolytic streptococci from early cases of scarlet fever; these organisms were apparently peculiar to the disease in that they were specifically opsonized and agglutinated by the serum of a sheep immunized with a haemolytic streptococcus obtained from scarlet fever.

Professor G. Caronia and Dr. M. B. Sindoni[5] have also tackled this problem, and feel themselves justified in going a stage further than previous investigators, for they assert with conviction that this organism bears a causative relation to the disease. Their work on the serological behaviour of this streptococcus confirms that already cited, and they have also conferred passive immunity on infected rabbits by injection of serum from children convalescing from scarlet fever. They claim to have actively immunized children by vaccinating them with killed cultures, such children being afterwards exposed to scarlet fever without contracting the disease. They also inoculated five children who were convalescing from measles, and all of these children developed what is asserted to be an attenuated form of scarlet fever after inoculation with the cultures. Serological tests with these children were positive, and they were further submitted to contact with other patients with scarlet fever, but did not contract the disease.

Such heroic appeal to experiment on human beings (which, it is to be hoped, was not attended with any ill consequences) has an even more startling precedent in the case of Takahashi of Tokyo,[6] who injected five of his own children, aged 3 to 10 years, subcutaneously with 0.0001 c.cm. of the blood of a scarlet fever patient. No general or local reaction ensued, but a certain degree of active immunity was produced, as was shown by the fact that hypodermic injection of 0.15 c.cm. of a scarlatinal patient's blood fifty days after the inoculation, and the smearing of the child's throat with the secretion of the throat and blood of the patient fifteen days after inoculation, failed to cause any disease.

The last and most recent paper on scarlet fever to which we wish to draw attention appears in the *Journal of the American Medical Association*, and is contributed by Drs. George and Gladys Dick.[7] A nurse who was taking care of a patient with scarlet fever contracted the disease in a mild but typical form. Two days before the onset of symptoms she noticed that she had a sore finger, and on the second day of the disease, when the rash was intense, a few drops of pus were obtained from the lesion on the finger. A haemolytic streptococcus and diphtheroid bacillus were recovered by culture of this pus. After careful purification of the streptococcus five volunteers were inoculated by swabbing the tonsils and pharynx with four-day-old cultures of the haemolytic streptococcus, grown on sheep's blood agar slants. Three of these experiments were entirely negative, but in one volunteer the inoculation was followed by a sore throat and fever without a rash, and one developed typical mild scarlet fever. To test the possibility that some ultramicroscopic virus was also concerned in initiating the disease, sterile filtrates from the haemolytic streptococcus culture were inoculated into five volunteers, but they developed no sore throat, fever, or rash. On the eleventh day following inoculation with the filtrate four of the volunteers were inoculated with an unfiltered four-day-old culture of the haemo-

[1] G. Caronia: *Pediatria*, Naples, 1923, xxxi, 801.
[2] M. H. Gordon: BRITISH MEDICAL JOURNAL, 1921, i, 632.
[3] W. P. Bliss: *Bull. Johns Hopkins Hosp.*, 1920, xxxi, 173; *Journ. Exper. Med.*, 1922, xxxvi, 575.
[4] R. Tunnicliff: *Journ. Amer. Med. Assoc.*, 1920, lxxiv, 1387; *Journ. Infect. Dis.*, 1921, xxix, 91.
[5] G. Caronia and M. B. Sindoni: *Pediatria*, 1923, xxxi, 745.
[6] *Japan Medical World*, Tokyo, 1921, i, No. 2, pp. 1-4; Abstract, BRITISH MEDICAL JOURNAL, 1921, ii, p. 249.
[7] G. F. Dick and G. H. Dick: *Journ. Amer. Med. Assoc.*, 1923, lxxxi, No. 14, 1166.

lytic streptococcus. After the second inoculation two remained well without any evidence of scarlet fever, in one sore throat accompanied by a rise of temperature occurred without any rash, and one developed a sore throat but had no fever or rash. The other volunteer of this series was inoculated with an unfiltered culture of the haemolytic streptococcus on the thirteenth day after inoculation with the filtered culture; forty-eight hours later typical scarlet fever developed. A consideration of this evidence makes it seem likely that the two cases of experimental scarlet fever reported were caused by the haemolytic streptococcus or by some unrecognized organism closely associated with it in culture.

Thus, evidence is steadily accumulating from different parts of the world in favour of the view that a particular type of haemolytic streptococcus may be the causal agent in scarlet fever, but we cannot end better than by quoting the praiseworthy caution contained in the sentence with which the last article referred to concludes: "These experiments do not justify the conclusion that all cases of scarlet fever are caused by the haemolytic streptococcus described."

INTESTINAL STASIS AND CANCER.

BOTH in the professional and the public eye the etiology of cancer now fills a larger place than even in recent years, and avenues of various kinds have been surveyed and explored—for example, in his *Diseases of the Rectum and Colon*, reviewed elsewhere in this issue, Mr. Lockhart-Mummery suggests "that our disgusting habit of burying our dead has much to do with its prevalence," and Sir Frederick Treves has correlated the increased use of tinned meat with the rise in cancer incidence. The freedom of primitive races from this scourge has often been asserted and occasionally challenged; but assuming that aborigines, free from contact with the vices and virtues of the rest of the world, are little subject to malignant disease, the relation between civilization and cancer must be explained by some supposition other than that the secluded state of the natives of an almost unknown country is responsible for ignorance of their diseases. It has been thought that syphilization, which so often accompanies so-called civilization, may play an important part, and that cancer is thus a disease of civilization; it might indeed be argued that syphilis exerts a more widespread influence in the causation of carcinoma than is generally recognized at present—namely, that its disposing influence is by no means confined to the oral and lingual surfaces. Sir Arbuthnot Lane has for years insisted on the importance of intestinal stasis in the causation of a large number of morbid conditions; his far-reaching thesis has aroused much criticism, and it is perhaps not untrue that a superficial familiarity with his views, and especially the heroic remedy of colectomy, have led to some want of respect. It may, however, be noted that Dr. J. G. Adami, who in 1914 (BRITISH MEDICAL JOURNAL, 1914, i, 177) submitted the conception of intestinal stasis and toxaemia to considered criticism, contributed a somewhat repentant chapter to Sir Arbuthnot Lane's symposium on *The Operative Treatment of Intestinal Stasis* (Oxford Medical Publications, fourth edition) in 1918. Indeed, it may well be that in future years Sir Arbuthnot Lane will be recognized as a prophet who spent many years crying in the wilderness before his ideas were worked out for final acceptance.

The external surface of the body is mainly a defensive covering, whereas the linings of the alimentary and respiratory tracts provide for the entrance into the body of material essential to life, and incidentally are liable to bacterial invasion and the absorption of poisons; that disease elsewhere in the body may have an intestinal origin is of course beyond dispute. As chronic irritation and inflammation are recognized antecedents of cancer, this sequence of events must be included among the diseases thus induced in the alimentary canal—for example, chronic ulceration followed by gastric carcinoma. The influence exerted by intestinal infection and toxaemia on the body generally is a large problem and deserves serious consideration. It is almost too obvious to remark that health and growth largely depend on the absorption of normal food products from the alimentary tract, and that therefore a pathological change in the gastro-intestinal functions cannot fail to be reflected in disorder of the habit of growth and functions of the body. On page 745 Sir Arbuthnot Lane reiterates his belief in the harmful influence of constipation, which he ascribes to the diet of civilization, and proceeds to the conclusion that cancer is the last stage in the sequence of its evil effects. Thus degenerative and cystic changes in the mamma, regarded as due to toxins absorbed from the intestines, are commonly associated with and may precede carcinoma of the breast.

While the exact cause of malignant disease is not yet revealed there is much evidence, both clinical and experimental, that chronic irritation induced by various agents such as soot, tar, arsenic, parasites (*Bilharzia*, *Spiroptera neoplastica*), *x* rays, and paraffin may be followed by carcinoma. These irritants act locally in a somewhat intensive manner, and considerable time elapses before carcinoma develops *in situ;* it might, therefore, be thought to strain analogy to argue that poisons absorbed from the gastro-intestinal tract, which would necessarily be much diluted, can so modify the habit of cellular growth that malignant disease would result. There is as yet no convincing proof of this sequence, and it must be further admitted that clinical evidence so far as it goes does not confirm Sir Arbuthnot Lane's contention that the cancerous patient is always the subject of chronic intestinal stasis. Indeed, it would be pressing the argument rather too far to suggest that intestinal stasis is a necessary antecedent to all forms of malignant growth—for example, those in early life. But because there are obvious difficulties in the way of accepting such a proposition it would be equally unwise to neglect its potential bearings.

For this and for reasons of health there can be no doubt that Sir Arbuthnot Lane's emphasis on the prevention of chronic constipation by ordinary dietetic care and if necessary by paraffin, massage, and a suitable belt, is eminently sound. When prevention has failed and operative interference becomes necessary he now advocates a much less drastic procedure than in the past, and has found that by thoroughly freeing the junction of the iliac and pelvic colon, where "the last kink" occurs, a cure is effected, and thus the considerable risks and drawbacks of colectomy are obviated.

A SPECIAL congregation of the University of Manchester will be held on November 10th, when the Earl of Crawford, K.T., will be installed as chancellor and honorary degrees will be conferred on a number of distinguished persons, including Dr. J. G. Adami, F.R.S., vice-chancellor of the University of Liverpool, Sir Arthur Keith, F.R.S., conservator of the museum of the Royal College of Surgeons of England, and Sir J. G. Frazer, F.R.S., author of *The Golden Bough*.

THE UNIT SYSTEM.

Some considerations which have led to the abandonment of the unit system for surgery at the London Hospital are set forth in a letter from Mr. H. S. Souttar published in this issue (p. 783). Mr. Souttar has been director of this unit since it was originally organized in 1920. In his letter he explains that "the fundamental principle was that certain men, who had attained some distinction in their profession, were to be selected, invited to withdraw from private practice, and by the payment of a salary enabled to devote the whole of their time to teaching and research." The aim was admirable, but Mr. Souttar's experiences suggest that the plan does not yield the desired results. He points out at least three defects in the system which seem to warrant further inquiry. He deals first with the effect upon the teacher of being withdrawn entirely from private practice. He fears that it narrows his horizon to viewing both the disease and patient from the standpoint of the hospital ward only. Secondly, he regards the advantage to the student as relatively small, although the main disadvantage which he has himself observed is that when the student goes into practice he cannot have the benefit of the chief of the unit as a consultant for his private patients. Thirdly, Mr. Souttar, during his three years' experience, discovered that a director's opportunities for research were restricted by the absence of suitable cases to furnish material for clinical study, as doctors are apt to send their hospital patients into the wards of those members of the hospital staff they can call into consultation on their other and non-hospital patients. The account Mr. Souttar recently gave of the surgical clinics of Switzerland (British Medical Journal, June 2nd, 1923) shows that he is not blind to the merits of the Continental system nor unready to acknowledge shortcomings in our own. But it is evident that he thinks that the unit system as it has been essayed in this country is not likely to introduce the best features of Continental methods whilst preserving what is good in our own. The adequacy of our present hospital system to perform its threefold function of treatment, education, and research has been for some time the subject of serious discussion. In 1920 the plan was adopted of organizing at selected hospitals "units" with the object of improving at least the education and research sides. The plan was admittedly experimental, and it is not wise to ask too soon for results as though the experiment had been carried to its conclusion. Nevertheless, when the London Hospital finds grounds for modifying the arrangement, and Mr. Souttar describes the system as not generally suitable for our requirements, at least in the province of surgery, it may be time to pause and ask whether inquiry should not now be made into the working of this and other plans that have been introduced in the last few years.

THE HARVEIAN CELEBRATION.

The memory of Harvey, its greatest Fellow, was celebrated, as is customary, at the Royal College of Physicians of London on St. Luke's Day. In the afternoon Professor E. H. Starling, F.R.S., delivered the striking oration published last week, and in the evening the Fellows dined together in the College. At the meeting in the afternoon the Baly medal was presented to Mr. Joseph Barcroft, C.B.E., F.R.S., reader in physiology in the University of Cambridge, and the Bisset Hawkins medal to Dr. T. M. Legge, C.B.E., Medical Inspector of Factories, Home Office. The Baly medal was founded by Dr. F. D. Dyster in 1886, in memory of Dr. William Baly, physician to St. Bartholomew's Hospital, who was killed in a railway accident in 1861. The trust directs that the medal shall be presented every alternate year to the person who has most distinguished himself in the science of physiology, especially during the two years immediately preceding the award, and is not restricted to British subjects. The Bisset Hawkins medal was founded in honour of a Fellow of the College who did valuable pioneer work in respect to medical statistics. It is awarded every third year to a medical practitioner (British subject) whose work in advancing sanitary science or in promoting public health is considered deserving of special recognition. The dinner is held in accordance with Harvey's deed of gift made in June, 1656, just a year before his death. The gift, which consisted of his patrimonial estate at Burmarsh, in Kent, was to be used to promote friendship between the members of the College, and Harvey directed that "once every year there shall be a general Feast kept within the College for all the said Fellows that shall be pleased to come," and that on that day an oration should be delivered exhorting the members of the College "to search and study out the secrets of Nature by way of experiment." This year the toast of the Harveian Orator was given by the senior censor, Dr. Fawcett, and suitably acknowledged by Professor Starling. The College had the pleasure of welcoming Sir Robert Philip, President of the sister College in Edinburgh, and also Sir John Bland-Sutton, President of the Royal College of Surgeons of England; among the other guests were Lord Chelmsford, chairman of the council of University College, the Minister of Health, Lord Justice Atkin, Professor Langley of Cambridge, the heads of the Medical Services of the Navy and the Air Force, Sir Squire Sprigge, and Dr. R. W. Innes Smith of Sheffield, who, as has already been reported, recently presented a portrait of Sir Charles Scarburgh to the College; it was on view in the large library, and excited much interest. It was in the collection at Temple Newsam or Newsome, the famous old house near Leeds which, with its park and farm, was acquired some time ago by the corporation and was formally opened to the public last week. The place once belonged to the Knights Templars. It was afterwards the home of that learn'd and fair and good Mary, Sidney's sister Pembroke's mother. Darnley, the husband of Mary Queen of Scots and father of James VI of Scotland, was born there. Soon after James VI became James I of Great Britain the place passed into the possession of Sir Arthur Ingram, in whose family it remained until the end of the eighteenth century. The house contained many portraits, and those of Strafford, of the mother of Darnley (Countess of Lennox), of Darnley himself, of Mary Queen of Scots, and of their son, remain there. How Scarburgh's portrait came to be in the collection does not seem to be known. When it was sold not so long ago it was described as the portrait of a navigator, probably because some mathematical instruments were on the table beside the sitter. Scarburgh was in fact a mathematician, and lectured at Cambridge on the subject. He was ejected from his fellowship at Cambridge during the Caroline revolution, and entered at Merton College, Oxford, where his friendship with Harvey, which continued until Harvey's death, began. He settled in London in 1648, and two years later was admitted a Fellow of the Royal College of Physicians. Scarburgh's name is also connected with the history of the Royal College of Physicians of Edinburgh. He was physician to Charles II, and also to the Duke of York, afterwards James II; he went with the Duke to Edinburgh, where the party stayed at Holyrood and Englishmen first played golf, being initiated on the Leith links. The story is that Scarburgh's interest was obtained by Pitcairn, Sibbald, and some other physicians in Edinburgh, and that through the Duke of York he obtained from the King the grant of a charter for the Edinburgh College. Scarburgh was anatomical reader to the Barber-Surgeons' Company, which had his portrait painted in 1650; that portrait still hangs in the Barber-

Surgeons' Hall, and the picture now in the possession of the Royal College of Physicians appears to be a replica. It was to the acumen of Dr. Innes Smith, who is a collector of medical portraits, that the discovery of the replica was due; he saw it in a dealer's shop, recognized the subject, and acquired it. It is an important addition to the fine gallery in the possession of the College.

PHLEBOTOMY IN THE MONASTERIES.

At the meeting of the Section of the History of Medicine of the Royal Society of Medicine held on October 17th, Dom Louis Gougaud, O.S.B., made an interesting communication on phlebotomy in the monasteries. In mediaeval times blood-letting was very common throughout the monastic houses, and nuns as well as monks were periodically bled. The frequency of this practice may have been due to the sedentary and unhealthy mode of life in the cells and cloisters, and to the need for an effective prophylactic against the temptations of the flesh. In some religious houses it was done monthly, except when a feast intervened; in others the monks were bled every six or seven weeks; in others three, four, or five times a year, according to the rule of the Order. In particular the Canons Regular had fixed days for phlebotomy. Often the procedure was laid down with much precision with regard to place and time of day, the prayers and ritual to be observed, the person who should perform the operation, and even the costume to be worn by the patient. Bandages of special material were occasionally prescribed, and directions given for a preliminary warming of the arm. Detailed instructions governed the patient's diet and regimen during the period of rest after phlebotomy, and his relief from the full rigour of monastic discipline. The mediaeval chronicles examined by Dom Louis Gougaud indicate that this relaxation from discipline after blood-letting often succeeded in loosening the patient's tongue and sometimes led to unwonted confidences. Both the *Consuetudo* of St. Augustine's, Canterbury, and that of the Augustinian Priory at Barnwell, near Cambridge, throw much light on phlebotomy as performed in English religious houses in the Middle Ages. The records of the practice go back to the seventh century; the Venerable Bede (A.D. 674-735) left a treatise on blood-letting. By the tenth century periodical bleeding was definitely accepted as a monastic custom, and it prevailed for several hundreds of years afterwards. In the discussion of the paper Sir D'Arcy Power observed that the dietetic indulgences which followed monastic blood-letting may have had the effect of causing an early need for further phlebotomy. He suggested also that the "unlucky days" must have been very convenient to the operator as an excuse for suppuration or other mishaps following the operation. Dr. Singer concurred in this, remarking that no two monastic calendars agreed as to the "unlucky days," so that a misadventure could almost always be ascribed to supernatural influences. At the close of the meeting Mr. C. J. S. Thompson showed an interesting exhibit of blood-letting instruments and cupping appliances, which he had brought from the Wellcome Historical Medical Museum.

PUBLIC HEALTH IN RUSSIA.

We publish this week the third and concluding instalment of an article on public health in Russia by Dr. Haden Guest, who has recently visited that country. The article is undoubtedly tendencious, but this does not to any material extent diminish its interest. The interest lies in the picture drawn, with obvious sincerity, of the courage and resource with which the Russian people are themselves endeavouring to get the country into order, and of the kindly expert guidance given by the Russian medical profession. It had to face both epidemic and endemic disease of a kind and of an extent sufficient to appal the stoutest heart; very many of its members have given their lives in the attempt to prevent or remedy the consequences of famine and the ravages of disease. So far as epidemic disease is concerned considerable success has been attained with the assistance of the Epidemic Commission of the League of Nations and the American Relief Association. The picture Dr. Haden Guest draws, while it contains many dark shadows, is encouraging, and its truth is corroborated in its main outlines by the experience of Professor Piip, formerly Esthonian Foreign Minister, recently transmitted by the Riga correspondent of the *Times*. In his opinion the nineteenth-century theories which actuated the leaders of the revolution, theories which have long been obsolete in most other countries, are now obsolescent in Russia, where the people themselves are realizing that discipline is necessary to the comfort of the individual and the prosperity of a nation; he instances the greater attention now paid to street scavenging, but he admits that Russia has not yet become tranquil and happy, and says that "judged by our standards life is hard, notwithstanding that the requirements of the people have been reduced to a minimum." The new bourgeoisie and the new intelligentsia "have emerged from the struggle for existence hardened, and above all practical, people." This view is confirmed by what Dr. Haden Guest has to tell us about the schemes for improving the conditions of child life and the preliminary steps which have been taken to deal with tuberculosis in schools. In sending the manuscript of his article he was good enough to accompany it by a number of photographs, but it was not thought that reproductions of them would be of interest to our readers, for a clinic in Russia is so like a clinic in Great Britain that they are only to be distinguished by the language of the notices. There is a great deal of human nature in man, and when we come down to fundamental things, such as the medical treatment of the ailing and sick, it is very much the same nature in Russia and in Great Britain.

THE STORAGE AND SUPPLY OF OXYGEN.

THE Oxygen Research Committee, appointed in January, 1919, has presented a report[1] on the work done down to the early part of this year. During the war investigations were begun under the War Office, the Aircraft Production Department, and other Government departments; in the summer of 1918 a special committee was set up to co-ordinate the work of the various departments as part of the general arrangements for dealing with the production and distribution of oxygen in this country. After the armistice there was a general feeling that the researches should be continued, and consequently an Oxygen Research Committee was appointed under the chairmanship of Professor J. F. Thorpe, D.Sc., F.R.S. It contained representatives of the War Office and of the Air Ministry, and a number of experienced workers in physiology and physics. The fundamental problem was to endeavour to furnish, especially for aeronautical, medical, and other scientific purposes, a more ready means than then existing for the utilization of the oxygen. The war committee had investigated the production of satisfactory light cylinders for compressed oxygen, but the question was of wider scope, since other gases had to be considered at the same time; it was therefore handed over to a Gas Cylinders Research Committee appointed in 1918, and in 1921 it recommended and specified lighter cylinders for commercial use. The Oxygen Research Committee, however, retained its interest in the problem in view of the fact that there is still urgent need, for use in hospitals and for other special purposes, of cylinders even lighter than those recommended

[1] Published under the authority of H.M. Stationery Office, 1923. Price 8s. 6d.

by the Gas Cylinders Committee. Nearly the whole of the present report is concerned with this problem; its first part contains a general description of the vacuum vessel and a discussion of the theory underlying its use for the storage of very cold liquids. A detailed account of the methods of manufacture of vacuum vessels is given in the second part, and in the third and fourth some important aspects of the use of vacuum vessels are discussed. The Oxygen Research Committee had the advantage of starting with a knowledge of the late Sir James Dewar's pioneer researches into the liquefaction of gases; to him was due not only the invention of the double-walled metal vacuum vessel, but also the discovery of the highly adsorbent properties of charcoal and other materials at low temperatures. His application of this to the construction of metal vacuum vessels was the determining factor in rendering possible the use on a large scale of liquid oxygen and liquid air. The Oxygen Research Committee was concerned to make possible the increased use of oxygen in the liquid form, and had first to consider the difficulties of economic production on a commercial scale and those of handling and utilizing the liquefied gases. This was the immediate need, for, except in the most favourable circumstances, the methods then available did not render practicable the use of liquid in place of gaseous oxygen, though the latter method was severely handicapped by the weight of the containers. The Committee, therefore, has been principally concerned with the development and further use of the double-walled metal vacuum vessel to contain liquid oxygen. As has been said, the major part of the report is devoted to this matter, and practical conclusions are drawn for the benefit of manufacturers. The report does not deal with certain other problems the Committee has considered; among these is the development of vaporizer devices for the administration of gaseous oxygen from a liquid supply. Advances have been made and further improvements are constantly being introduced, and about these the Committee intends to issue another report. It is pointed out that a matter which has been and remains one of considerable concern, especially to the medical profession, is the price of oxygen. The Committee is not yet in a position to express an opinion on the possibility of a reduction in the present cost of oxygen, but it is convinced that, for medical purposes especially, it is a matter of vital importance, since the current prices restrict its use for such purposes to quantities much below those in which it could usefully be employed. The purity of the gas is also a matter of great consequence when it is required for administration to patients.

THE GUILD OF ST. LUKE.

THE annual service of the Guild of St. Luke, the Evangelist and Physician, was held on Thursday evening, October 18th, St. Luke's Day, in St. Paul's Cathedral. Members of the guild and their friends attended in good numbers; many of the medical practitioners and students who were present wore academic dress, and joined in the solemn procession which took place at the end of the service. The organist and choir of St. Mary Abbott's, Kensington, gave valuable help, and evensong, which was fully choral, included the anthem "Save us, O Lord" by Bairdon. The lessons were read by the warden, the Rev. J. Basil Rust, and the guild honorary secretary, the Rev. H. Kirkland-Whittaker, M.D. One of the four hymns sung during the service, "Thou to Whom the sick and dying," was rendered to the tune "Vevey," specially composed by Dr. Kirkland-Whittaker, this being the third occasion of its use at a guild annual service. The preacher was the Rev. Canon Simpson, D.D., who gave a striking address on the place of the work of the medical profession in the larger purposes of God. He called attention to the sympathy and faithfulness which characterized the friendship of St. Luke for St. Paul, and then proceeded to show how St. Luke had absorbed and recorded the cardinal principle of St. Paul's teaching—namely, reconciliation—the reconciling to God of all things both in heaven and earth, not as being the ambulance work of a disappointed deity, but rather as the final stage of a great universal spiritual process. Thus it was that St. Luke's gospel, with its deep appreciation of the essential characteristics of human nature, and its many parables of an understanding and a healing God, became indeed the gospel of the "Gloria in excelsis," the gospel of the rejoicing spirit of God its Saviour. In all her various manifestations Nature, whether human or physical, displayed both beauty and ugliness, joy and terror, but there was nevertheless nothing uncoverable by the great conception of God the Saviour. Christ had recognized the healing art as being part and parcel of His own work of reconciliation. The offertory, after defraying the cost of the service, was devoted to the mission fund of the guild. In the final procession the banners that were carried, the vestments of the clergy, and the robes of the graduates made up an impressive picture which brought a noble service to a fitting termination.

THE LISTER WARD AT GLASGOW.

MR. JAMES A. MORRIS, who is a distinguished Scottish architect, has published "a humble plea for the retention" of this famous ward in the Glasgow Royal Infirmary, written from a layman's point of view. We welcome this well reasoned and clearly stated contribution to a somewhat unfortunate controversy, and would venture to express the hope that Mr. Morris's plea may receive the full consideration it deserves. He gives us good grounds for his contention that this ward may be preserved as Lister knew it, without any prejudice to the present or any future scheme of enlargement or reconstruction, and shows how it might be made part of the gate-house block. All the world is united in admiration of Lister and his work, and may claim to be allowed a voice in deciding the fate of the ward. Glasgow people and their infirmary governors should surely admit this claim, and allow due weight to the sentiments which have so strong a hold on us all. It may well be worth while to preserve the old ward, not only out of affectionate respect for Lister, but also as an object lesson to future generations, from the inspection of which they may judge of the enormous improvements which have taken place, and yet may realize that the palatial modern operation theatre and surgical wards would be of little avail in themselves but for the discoveries which were applied to surgical practice in this shabby old building. Funds are being raised and generous contributions made to restore and preserve the ship in which a great English sailor lived and gloriously died. Must it be said by future annalists that at the time when this proper tribute was being paid to patriotic sentiment, the Scottish people turned a deaf ear to the prayer for the preservation of the building where another great Englishman began that epoch-making work which benefited and still continues to benefit the whole human race?

THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

THE annual meeting of the Society of Medical Officers of Health was held on October 19th at the house of the society in Upper Montague Street, when the President, Dr. Naylor Barlow, M.O.H. Wallasey, delivered an address. In the course of it he observed that, of the new activities of the public health service, that dealing with maternity and child welfare was producing the best results. Under the new conditions many children who survived infancy would be classed as healthy who would previously have been reckoned weaklings. Many of the disabilities of adult life

were caused by incomplete convalescence from ailments in childhood, and there was a great need for an increased number of inexpensive convalescent homes. The annual dinner of the society was held in the evening, when the Minister of Health proposed the toast of the society, which, he said, was founded on a small scale in 1875, but now numbered over 1,800 members. The introduction of modern sanitary measures was due in large part to the advocacy of medical officers of health, and they had had a great share in the clearing of the slums. Looking to the future he expressed the hope that they would assist him in a campaign he proposed to institute for the construction of new arterial roads. People followed roads if they afforded ready means of transport, and he hoped that factories would be established on these roads, so that the workers might live in healthy surroundings. Dr. Naylor Barlow, in his reply, criticized the recent action of the General Medical Council in revising the curriculum for the diploma in public health, with the result that future candidates would have to spend two years on the special course after they had taken a registrable medical diploma. In proposing the health of the guests Dr. F. E. Fremantle, M.P., succeeded in the difficult task of mentioning, with a graceful adjective, all the principal guests. In the course of his remarks Dr. Fremantle spoke of Lord Riddell as the doyen of journalists, an epithet which seemed a little to nettle Lord Riddell, who, in his reply, appeared to question its correctness. However, he told several good stories, and promised to make another collection for next year. Sir Squire Sprigge, who also replied to the toast of the guests, spoke of the growing complexity of medicine and the difficulties it created for the editor of a medical journal—difficulties which, he said, would be insuperable but for the assistance readily given by members of the profession having knowledge of special subjects. Among other guests present were the President of the Royal College of Physicians (Sir Humphry Rolleston), Sir George Newman, Sir Arthur Robinson, K.C.B., Sir William Hamer, Lady Murphy, Dr. Wallace Henry (Chairman of Representative Meetings, British Medical Association), Dr. Alfred Cox, Medical Secretary, and Sir Dawson Williams, Editor of the BRITISH MEDICAL JOURNAL. The toast of the President was given by Sir Benjamin Johnson, High Sheriff of Lancashire, and suitably acknowledged by Dr. Naylor Barlow.

TREATMENT OF TUBERCULOSIS BY THE SPAHLINGER METHOD.

ACCORDING to what appears to be an authoritative communication, published in the *Times* of October 17th, a meeting was held recently in London at the invitation of Baron Henri de Rothschild, who is a member of the medical profession, to consider what steps should be taken to provide a fund to prevent the closure of M. Spahlinger's laboratory at Carouge, near Geneva. Such particulars of M. Spahlinger's methods and of the production of his vaccines and serums as were available were given in two articles published in the BRITISH MEDICAL JOURNAL of May 12th (p. 830) and June 2nd (p. 938). Dr. Leonard Williams recently reported (September 22nd, p. 519) a series of cases of tuberculosis he had observed under treatment by the Spahlinger method. It is stated that the meeting decided shortly to issue to members of the medical profession a pamphlet giving a history of M. Spahlinger's work accompanied by medical evidence and clinical details. Eventually it is proposed to make an appeal for subscriptions to meet the expenses already incurred by M. Spahlinger and to enable him to continue his work. It is reported that on October 15th the Lancashire Insurance Committee set aside a sum of £1,000 for the supply of these serums and vaccines.

FIRM ATTITUDE OF PANEL PRACTITIONERS.

WE are informed as we go to press that the interim returns from a considerable number of Panel Committees have been received, and that an analysis of them shows that the resignations tendered in these areas in response to the advice of the Insurance Acts Committee exceed the 66.6 per cent. required by the Committee. The Committee determined that it would not direct any resignations to be sent in unless two-thirds of the medical practitioners on the panel decided to resign. From information in the possession of the Committee it is confidently anticipated that the required percentage will be considerably exceeded before October 31st, the last day on which resignations can be sent in, as two months' notice must be given. In some districts 100 per cent. of the medical practitioners have already sent in their resignations to the secretaries of their Panel Committees.

TREATMENT OF SLEEPING SICKNESS BY BAYER 205.

THE *Cape Times* of September 19th contains an interesting "authorized" statement as to the results of the investigations which Professor Kleine and Dr. Fischer have just concluded in Rhodesia on the action of Bayer 205 in trypanosomal diseases. A previous note on their work was published in the BRITISH MEDICAL JOURNAL, January, 1923, page 35. About 230 patients in various stages of sleeping sickness were treated. Patients whose central nervous system was unaffected were, it is stated, cured after four injections (subcutaneous or intravenous) of 1 gram each. After the first or second injection the fever abated and the swelling of the glands began to go down. The efficiency of the treatment was so marked that natives came to seek it in large numbers. In cases where the brain was affected or paralysis had set in a longer course of treatment was required, but details as to the ultimate effects of such treatment have not been published. The action of Bayer 205 on ngana, a trypanosomal disease of cattle, was not so satisfactory, and its value in this disease is uncertain. It is promised that full details of the researches shall be published later.

WE publish this week a review of a book on gastro-enteroptosis on the principle that a good book should not suffer on account of the indiscretion of the publishers, but we regard the action of Messrs. D. Appleton and Co. of New York, in respect of the five monographs of which Dr. Coffey's is one, as indiscreet. The monographs deal with such unrelated subjects as traumatic shock, the reconstructive surgery of the upper extremity, gastro-enteroptosis, the transplantation of tissues, the surgery of the spleen, and physiotherapy. The publishers, however, decline to sell each monograph separately, and ask the sum of £6 5s. for the five volumes, which are issued in sets only. This is a most undesirable innovation, and we learn that at a meeting of the Library Committee of the Royal Society of Medicine, held on October 23rd, it was decided that the Honorary Librarian should write to the publishers to say that the purchase of the monographs would be considered when the restriction had been withdrawn. The Committee regarded the plan as a bad precedent which should not be allowed to pass.

WE may remind our readers that the Semon lecture will be delivered at the Royal Society of Medicine (1, Wimpole Street, W.) on Thursday next, November 1st, at 5 p.m., by Dr. A. Logan Turner, lecturer on diseases of the throat and ear in the University of Edinburgh. His lecture will be a plea for adequate training and closer co-operative action for the advancement of laryngology and otology. Students of the University of London and others interested in the subject are invited to attend.

Roll of Honour.

MEMORIAL TO MEMBERS OF THE NEW SOUTH WALES BRANCH

WHO DIED IN THE WAR.

ERECTED BY THE MEMBERS OF THE BRANCH.

Some time ago we published an account of the unveiling in Westminster Abbey of the tablet to the memory of those members of the R.A.M.C. who gave their lives in the war, and illustrated the article with a photographic reproduction of the memorial tablet. We have since had occasion to describe the unveiling of several other similar memorials, and it is not too late to reproduce a photograph of the tablet erected by the New South Wales Branch of the British Medical Association to those of its members who died on service. The memorial, a photograph of which is reproduced above, is of bronze mounted on marble, and has been erected in the hall of the British Medical Association building, Sydney; it was unveiled on December 6th, 1921, by Dr. Fourness Barrington, then President of the Branch, who delivered the following eulogium:

Let us remember with all humility and gratitude, before God and man, those brave colleagues of ours in the Medical Profession of New South Wales, who, in serving their Country in the Great Five Years' War of 1914 to 1919, gave their lives for the freedom of the world.

Their names are perpetuated in the Roll of Honour embossed on this beautiful tablet of bronze erected to their memory, for the unveiling and consecration of which we are to-day assembled.

At the call of their King and Country they left all that was dear to them, endured hardship, faced danger, and finally passed out of the sight of man by the path of duty: most of them resplendent with youth, full of vigour, and overflowing with hope and happiness.

We tender them our homage: and offer them our tribute of reverence and of thankfulness for all that their self-sacrifice helped to achieve.

By their loss we are the poorer: in their noble example we are the richer.

Let us keep their example before us in sad but proud remembrance. Let it be a light to inspire and guide us and those that come after us in the service of humanity.

"*Their Glory shall not be blotted out . . . and their name liveth to all generations.*"

God Save Our King!

PUBLIC HEALTH IN SOVIET RUSSIA.

BY

L. HADEN GUEST, *M.C.*, M.R.C.S.

(Concluded from p. 731.)

III.—A Tuberculosis Clinic for School Children.

Moscow is divided into seven districts, and the largest of these, the Zamoskvorechie district, in which there are many textile factories, food factories, and engineering establishments, has been chosen as the site of an anti-tuberculosis children's clinic.

The buildings are efficient and suitable, and the child population dealt with is between 50,000 and 60,000 in number; 150 children pass through the out-patient department daily, and 200 children are cared for in the day sanatorium or solarium. The children are kept in the open air (under shelter) continuously, and the institution on this side corresponds with our English open-air schools except that special clothing is provided. The clothing is designed to be sufficient for warmth but also loose enough and exiguous enough to allow free circulation of air round the body and free exposure of arms and legs to the sun. The children, whom I saw on an overcast and chilly day, were warm, comfortable, and even healthy-looking apart from the obvious signs of tuberculous trouble. Each week the children are examined by a medical board of five doctors at which students attend, as the institution is used for teaching as well as curative purposes.

An important aspect of the work is the close association which is maintained between the factories and workshops of the district and the clinic. A committee of twenty representatives of the factory workers meets regularly at the clinic to keep in touch with the doctors and the medical side of the work; and in the factories these representatives, with other factory workers, unite to form what one may call Factory Hygiene Committees, whose duty it is to bring to the notice of the doctors any conditions of work which affect health adversely. The system works well, and has the effect of bringing a realization of working conditions before the medical staff on the one hand, and a realization of the influences of these on the health of the individual before the workers. The co-operation is valuable, and might well be imitated in this country. The Central Workers' Committee has at its disposal three women inquiry officers, who discharge the duties of health visitors and care committee workers.

Another feature of the work is the promotion of travelling hygiene exhibitions, as well as an exhibition of hygienic interest in the clinic itself. The travelling exhibitions go to the works and help to make the workers realize the conditions affecting their health.

These steps are taken not only as a matter of general hygienic education, but to help toward early diagnosis. The methods of diagnosis are: (1) by ordinary medical examination, for which specialists in tuberculosis are available; (2) laboratory tests; (3) *x*-ray examination; and (4) the Pirquet test. The aim of the diagnosis is to secure early and efficient treatment in institutions suited to the case—day sanatoriums, resident sanatoriums, forest schools, etc.

The method of examination of each case is as follows: The child is weighed and measured, including measure of sitting height and chest measurement. The temperature is taken, and estimation made of the haemoglobin in the blood and a Pirquet test made. Urine and sputum are examined if necessary, but not always. About 95 per cent. of the children examined give a positive Pirquet reaction.

A valuable part of the work of this clinic has been the studying of the social conditions of the district of Moscow in which it is situated. Most elaborate investigations have been made and charts and diagrams prepared to illustrate each separate point. The frank revelation of bad conditions is in one sense discouraging, but in another it gives one greater confidence in the administration of the Communists, as it involves a definite facing of very unpleasant facts, and the institution is, of course, under Communist control.

The statistics as to the feeding of the child population and other matters are as follows:

Food.

Good—two principal meals daily	2 per cent.
Medium—a meal sometimes missed ...	31 ,,
Bad	65.6 ,,
Famine	1.4 ,,

Occupation.

Manual workers	73.6 per cent.
State employees in offices	24.5 ,,
Indefinite	1.9 ,,

Housing.

Legal cubic space allowed per person (adults and children)	64 cubic arshins*
Actual space	34 ,,

*An arshin is 1.5 metres.

Families per room (5 in family).

In 1 room	52 per cent.
In 2 rooms...	31.8 ,,
In 3 rooms...	14.7 ,,
In 4 rooms...	1.4 ,,

As regards utensils from which to eat their food, only 58.2 per cent. of children used separate plates. Over 50 per cent. of the children have no foot covering. There is a lack of conveniences for washing, 23.5 per cent. of the population having no soap. In regard to education, 83 per cent. can read and write; 14.4 per cent. are illiterate; 2.6 per cent. have attended secondary schools.

There is no attempt in these figures to convey a very roseate view of the situation, and when it is remembered that the figures do not take cognizance of the vagrant child population it is clear that the situation is not good.

The antituberculosis clinic I visited is the only one in Moscow specially set aside for children's work, but there are ten other clinics in Moscow at which both adults and children are attended. There is also near the centre of the town, at No. 12 Solanka Boulevard, the old orphan asylum, which is being used as a maternity and child welfare clinic and which has a very excellent modern installation for the sterilization and distribution of milk. There is also being equipped—the rooms I saw were freshly prepared for the work—a new research institute where all children's diseases will be studied. Attached to this institute is a good museum where "permitted" and "not permitted" foods are shown in different groups—the models being so good that it is impossible to detect their unreality except by touch and smell. In this museum also is a complete series of models of children's stools, ranging from normal, through normal *plus* milk curd, to the most extreme examples of acute enteritis. These models are also excellent.

The pictures are also very good indeed and convey the simple lessons of the hygiene of maternity and childhood with a force which needs no letterpress to explain it. The pictures have been made by well known Russian artists and are much more vivid than those usually seen and used for such purposes. Among them are four pictures, in oils, by M. Archipoff, which contrast the care bestowed on pregnant animals and the lack of care given to pregnant women. These pictures are scenes from peasant life—M. Archipoff is by origin a peasant. One of them shows the careful feeding of a pregnant horse and another a pregnant cow. Another shows a beautiful gold and green Russian landscape and a pregnant woman working hard at the harvest. There is no doubt about the propaganda intention, nor about the effect of this picture, but it is also one of the most beautiful modern pictures I have seen. Its vivid green and gold is a thing of delight. Then, too, there is a peasant interior, a picture of women, one pregnant, working at some vigorous task of cleansing in the house—the light of the fire, the vivid red, and the mystery of smoke make it as wonderful almost as a Rembrandt. The pictures are realistic to a detail, but they are as beautiful and as aesthetically satisfying as all great works are.

In Russia, in all kinds of places, one sees the pictures of Karl Marx, and it is significant that in this exhibition his picture is balanced in a place of equal honour with that of Charles Darwin. And in the galleries are pictures of Koch, of Behring, of Lister, of Jenner, and of other great benefactors of the race, while the motto which runs

between the pictures of Marx and Darwin claims science as a weapon in the fight for emancipation by the proletariat. The day of the persecution of scientists has gone.

Russia works slowly but she gets things done. Probably for years to come there will exist conditions in that country which will be disturbing to sanitarians accustomed to the ordered security of English life. But the definite and sustained effort to spread scientific knowledge will produce in that country, which is almost a continent, changes of the greatest world importance. And not least significant of present movements in Russia is the expressed desire for a close and cordial entente with scientists and medical men of all other countries.

England and Wales.

The Welsh National Medical School.

Early this year we reported that the University College of South Wales and Monmouthshire was seeking a new charter, and that the Privy Council had criticized the draft and expressed the view that it would be best to constitute the Welsh National School of Medicine as a separate constituent college of the University of Wales, to be governed, under the University, by a council and senate of its own, as recommended in the report of the Royal Commission on University Education in Wales. It was later pointed out by the Privy Council that the principal objects of any scheme should be to provide an organization which would afford the school the best opportunity of developing successfully into a first-rate centre of medical teaching and research, give it a genuinely national status, and at the same time recognize the special interests of the Cardiff University College in it. The annual report of the Council of the College, presented to the Court of Governors at its last meeting, in referring to the charter, stated that a large and representative committee which had been appointed to consider the objections of the Privy Council hoped to report in due course. Reference was also made in this connexion to the communication received from the Secretary of the Conjoint Board in England, stating that the school was recognized provisionally for the complete curriculum, for one year, from October 21st, 1922, and indicating certain conditions which should be fulfilled if the recognition was to be permanent. Subsequently a communication was received from the Senate of the University of London stating that subject to compliance with similar conditions the Senate would be prepared to recognize the school as an institution from which the University would receive certificates for the complete course of medical education preparatory to the M.B. and B.S. examinations. The conditions, the report continued, related mainly to the provision of additional beds for the medical unit and the appointment of additional teachers. The authorities of the Cardiff Royal Infirmary professed themselves unable, in view of existing financial circumstances, to provide any additional accommodation, but the difficulty has been overcome by a reallocation of the beds in the hospital, which will provide the necessary number for the medical unit. With the approval of the University of Wales, arrangements have been made by which members of the staff of the Cardiff Royal Infirmary will become recognized clinical teachers in the medical school and receive honoraria for their services. A total sum of £500 a year has been provided in the budget for the coming year as a contingent sum for this purpose. An appeal has been made for a sum of £5,000 a year to comply with the conditions attached to the grant of a like amount made by the University Grants Committee. The sum required, it is stated, is practically assured and will be provided mainly by contributions from local authorities from the proceeds of a rate of one-eighth of a penny. To meet the additional expenditure of the school for the past academic year a sum of £2,169 has been transferred by the Appeal Fund to the College; a sum of £18,363 is still required to meet the deficit for the year. The University Council has decided that its grant to the medical school shall be fixed at £14,575 a year for a period of three years. The total income of the school for the last academic year was thus £16,744, but the whole amount has not been expended, and the surplus of £855 has been reserved for the purchase of necessary equipment. The interesting announcement is made that it is proposed to establish a lectureship in orthopaedics in the Welsh National Medical School; it is hoped that for this purpose a contribution may be made by the trustees of the Welsh Hospital Netley Fund, which may be utilized for a purpose having relation to the disabilities of ex-service men. Probably no more suitable destination for the funds in hand could be found than the endowment of the lectureship proposed. A couple of years ago the College made an appeal for a capital sum of a quarter of a million, and we learn from a report of the meeting of the Court of Governors in the *Western Mail* that towards this amount a sum of £80,000 has so far been subscribed.

Liverpool Medical Institution.

At the first meeting of the eighty-fifth session of the Liverpool Medical Institution, held on October 18th, the President, Dr. J. Hill Abram, delivered an inaugural address, taking as his subject "Looking Back." Members and associates were received by the President prior to the delivery of his address. The President limited his retrospect to forty years, dating back to the year he became a medical student. He first touched upon the progress that surgery had made, alluding to the evolution of antiseptic surgery and aseptic methods, pointing out that the great war had brought into prominence the importance of the antiseptic method in wound treatment. He thought that the value of speed in operation, which in the pre-anaesthetic period was considered of great importance, should not be overlooked. He considered that the greatest advance had been made in orthopaedics, and critically observed that the great object of medicine was to prevent resort to surgery. Out of the science of bacteriology born some forty years ago sprang vaccine and antitoxin therapy. As was often the case in the history of medicine, the anticipation connected with new remedies fell short of realization. It was in that class of case where failure was signal that our knowledge was wanting, in other words the elaboration of antibodies was still an unknown factor in such cases, and as an example he cited the failure of vaccine treatment in coryza. On the other hand, he had evidence of the striking effect of vaccine treatment in the early stage of croupous pneumonia. After a tribute to the great service the discovery of *x* rays by Roentgen had rendered to medicine, he passed on to consider the relation of the endocrinal glands to body metabolism. The efficiency of thyroid treatment in myxoedema was frankly admitted, but the treatment of Addison's disease by adrenaline and tuberculin had been distinctly disappointing. In alluding to the elaboration of clinical methods of investigation of disease by expensive instruments, Dr. Abram drew attention to the obvious fact that such methods could only be carried out in hospitals. There was a tendency for the student to think more of these methods and overlook the cultivation of sight, hearing, and touch in diagnosis. The trained senses after all were those factors on which the majority of practitioners would have to rely in the treatment of disease, especially in districts remote from towns. In conclusion he deprecated the tendency to publish jejune observations disguised as a preliminary note, and urged the importance of cultivating lucidity, a word to which the late Matthew Arnold, in an address delivered in 1882 at the opening of the Royal Infirmary School of Medicine in Liverpool, gave the meaning "the ability to see things as they are." The temptation should be resisted to publish, at the instance of a clamorous press, matters in which research was still necessary and authoritative statements quite out of place. The address was critical throughout, and was much appreciated by the members. Dr. Hope, M.O.H. Liverpool, proposed, and Dr. Henry Harvey seconded, a vote of thanks, which was carried unanimously with acclamation. Afterwards the President entertained the members to refreshments followed by a concert of Elizabethan music, and the audience was delighted by madrigal and song, taken alternately from music of the sixteenth century. Mr. Walter E. Bridson, F.R.C.O., proved himself to be an efficient accompanist of the songs, which were rendered with great taste.

Clinical Laboratories at London Mental Hospitals.

At most of the mental hospitals under the control of the London County Council clinical laboratories exist, but the Mental Hospitals Committee is now proposing that a clinical laboratory shall be established at every one, the equipment of them all to be standardized, and arrangements to be made for the co-ordination of their work with that undertaken at the central pathological laboratory at the Maudsley Hospital. This proposal will entail an estimated expenditure for all the hospitals together of £710 initially, and £350 a year for maintenance. A new position of laboratory assistant is to be created at the mental hospitals, at a rate of pay equivalent to that of a male chief charge nurse. This laboratory assistant, in addition to performing such duties as are required in the laboratory, will take over the duties of mortuary or *post-mortem* attendant, now performed by one of the male nurses.

Post-Graduate Courses in London.

The programme of special courses arranged by the Fellowship of Medicine and Post-Graduate Medical Association covers a wide range of subjects, beginning with a fortnight's course in general medicine and surgery at the Royal Northern Hospital, in conjunction with the Central London Ophthalmic Hospital, North-Eastern Fever Hospital, and the Royal Chest Hospital. Clinical demonstrations in the various departments will be given each day from 10.30 a.m., concluding with a lecture at 4.30 p.m. Also beginning on November 5th and continuing throughout the month there will be a course in gynaecology at the Chelsea Hospital for Women. Lectures will be given by members of the staff each day, preceded by demonstrations in the out-patient department or operations in the theatre. A month's course in psychological medicine has been arranged at the Maudsley Hospital, Denmark Hill, and will consist of lectures and demonstrations on the psychoneuroses, the practical aspect of mental deficiency, the pathology of mental diseases, clinical psychiatry, and crime and insanity. Also at the London Lock Hospital (Dean Street and Harrow Road) a comprehensive course of lectures and clinical demonstrations on venereal diseases will be given from November 5th to 29th. A lecture on some aspect of the subject will be given each day, supplemented by clinical work in the wards and out-patient department. From November 19th to December 15th a practical course in ophthalmology will be given at the Royal Westminster Hospital. In addition to clinical instruction every afternoon from 2 o'clock, a practical fundus class and special demonstrations in medical ophthalmology and methods of examination will be given three times a week at 10 a.m. Beginning on Monday next (October 29th) a two weeks' course in dermatology will be given at the Hospital for Diseases of the Skin, Blackfriars, consisting of clinical instruction every afternoon from 2.30, with special demonstrations on selected cases. Further particulars and copies of the syllabus of any of these courses will be forwarded on application to the Secretary to the Fellowship of Medicine at 1, Wimpole Street, W.1.

The Recent Outbreak of Small-pox in London.

The Public Health Committee of the London County Council submitted to that body on October 23rd a report of the recent outbreak of small-pox in London. There were 18 cases (2 fatal), of which 11 occurred in the County of London and 7 in the extra-metropolitan districts. Attention was first directed to the appearance of small-pox on September 7th by the medical officer of health for a South London borough, who discovered a case in a girl employed as a chambermaid at a hotel in Central London. This girl had waited upon a lady visitor from Spain who had been ill at the hotel from August 13th to 19th, with what was thought, without medical advice, to be influenza, with spots attributed by her to fish poisoning. Four other cases were discovered within twenty-four hours in widely separated districts, and contact with the original case from Spain could be traced in two of these cases. The Spanish visitor herself was traced to an address in an out-county suburb, where she was found to be recovering from a mild attack of small-pox, but she had infected an adult relative, who was suffering from a severe attack, and another relative with whom she had been in contact was also discovered to be suffering from small-pox. It appeared that the lady had left Valencia, where there was an epidemic, on August 4th, and after staying at the hotel in London had left for the suburb where she was discovered, and where her complaint had been diagnosed as chicken-pox. After her removal to hospital 10 further cases occurred, 3 evidently having been infected by the original case, and 4 presumably by one of the infected employees at the hotel. Of the remaining 3 cases, one was a man employed at the laundry which washed the hotel linen, and the other 2 were persons who had afterwards occupied that particular room at the hotel. Among the patients there was only one child, an unvaccinated boy of 12 years. Of the 18 patients, 12, whose ages ranged between 23 and 79 years, had not been vaccinated since infancy, and of these one died; 5 between the ages of 12 and 50 had never been vaccinated, and of these one died; one patient had been vaccinated in the army in 1914 and suffered a mild attack.

Scotland.

Cameron Prize Lectures in Edinburgh.

The recipient of the Cameron Prize for 1923 at the University of Edinburgh, Professor J. J. R. Macleod, M.B., F.R.S., Professor of Physiology in the University of Toronto, delivered the two Cameron Prize Lectures in the anatomy classroom on October 16th and 17th. Principal Sir Alfred Ewing in introducing the lecturer stated that the Cameron Prize was the highest honour the University of Edinburgh had to bestow on work in practical therapeutics, being awarded to anyone who in the preceding five years was considered to have made an important and valuable discovery in that subject. Professor Macleod had played a most distinguished part in the development of treatment of diabetes by insulin—a treatment which, if it could not be said to effect a cure, had at least brought restoration and hope to many sufferers. The discovery had focused the attention of the medical and scientific world upon Professor Macleod's laboratory in Toronto, though the credit was of course shared with co-workers. The discovery of the substance had been made there by Dr. Banting, who, along with Mr. Best, had shown that it could be prepared by using partially degenerated pancreas; and this fundamental discovery had been developed by Professor Macleod and his co-workers, especially by Mr. Best and Professor Collip. Professor Macleod's lecture dealt with the "Nature of Control of the Metabolism of Carbohydrates in the Animal Body." It had been supposed, he said, for many years that carbohydrate metabolism was regulated by an internal secretion of the pancreas to which Sir Edward Sharpey Schafer had actually given the name of "insulin," but it had not been possible to isolate that material until the researches of Dr. Banting and Mr. Best. The method by which insulin could be prepared in adequate quantities from adult ox pancreas was devised mainly by Professor Collip. The use of the preparation had opened up a large field of investigation in metabolism, not only of carbohydrates but of fats and proteins. The address Professor Macleod delivered to the International Congress of Physiology in Edinburgh, in which he reviewed the whole subject, was published in the British Medical Journal of August 4th (p. 165).

Centenary of Mental Teaching in Edinburgh.

The delivery of the hundredth annual course of Morison lectures in Edinburgh was made the occasion of a centenary dinner in the hall of the Royal College of Physicians on October 16th, when Professor George M. Robertson, physician superintendent of the Royal Asylum, Edinburgh, was in the chair and delivered an address.

Professor Robertson's Address.

The historical narrative of the events connected with these lectures given by Dr. Blackhall-Morison in his centenary lectures began most appropriately with an account of the foundation of the Royal Hospital at Morningside, which is in itself a romantic story. It was founded by Dr. Andrew Duncan,

elected president of the Royal College of Physicians in 1790, in the hall of which college his portrait by Raeburn is to be seen. As a young man he attended to the poet, Robert Fergusson, when the latter suffered from an attack of acute mania, and was placed in the City Bedlam, a horrible institution, which stood on the site now occupied by the Royal College of Physicians Laboratory. After passing through the attack of mania Fergusson fell into a melancholia and ultimately died of exhaustion, on October 16th, 1774, exactly 149 years ago. Dr. Andrew Duncan was so overcome with the dreadful surroundings in which Fergusson, a man of sensitive feeling, was treated, that he determined to provide a suitable mental hospital for Edinburgh to take the place of the City Bedlam. Years went by, however, and Dr. Andrew Duncan apparently forgot his good intentions. He was a very busy man and Lord Cockburn says of him that he was a member of more societies of every kind and was actually the chairman or president of more societies than any other man in Europe. He is entitled to the credit of having founded three Royal corporations—no mean feat for one man.

An event which happened in the winter of 1786-87 brought back forgotten memories to the mind of Duncan; this was the visit of the poet Robert Burns to Edinburgh, who on arriving in Edinburgh at once set out to find the spot where the poet Fergusson—to whom he was indebted for some of his inspiration—was buried; with an honesty and generosity which were remarkable he erected a tombstone to his memory, on which he records his own gratitude. Andrew Duncan was interested in Burns and subscribed to the Edinburgh edition of his poems, and no doubt this action by Burns made a deep impression upon him, seeing that Fergusson had been his patient. Three years afterwards when he was elected president of the Royal College of Physicians, the first thing he did on the day after his election was to visit the cell in the City Bedlam in which Fergusson had died. He then called a meeting of the Council of the College and proposed that they should consider the question of erecting a mental hospital for Edinburgh. A committee was appointed and a scheme for the erection of such a hospital was launched under the auspices of the Lord Provost in 1792; towards it the College voted a sum of twenty-five guineas. Thus the first action the College took in this matter preceded the reforms instituted by Pinel in Paris by two years, and the scheme itself was publicly announced six days before the proposal to erect a retired habitation or Retreat for the Society of Friends. Owing to the Napoleonic wars the times were troublous and money was scarce, and as the hospital was designed on a fairly large scale it was not opened till 1813.

The College did something more than initiate the steps by which the Royal Hospital at Morningside was founded, for in 1853 it approached the managers of the hospital and requested them to give permission to Dr. David Skae, the then physician superintendent, to lecture on mental disease and to make use of the clinical cases at Morningside. This request was immediately granted, and four days afterwards Dr. Skae delivered his inaugural address. The managers of the Royal Hospital at Morningside, under the the guidance of Dr. Andrew Duncan, entertained the highest ideals of treatment, and they have continued to be an exceedingly enterprising and progressive body. First, they built the old East House and introduced the methods adopted at the Retreat at York, which, though proposed later, had been opened before the East House. They then built the West House for the poorer classes of patients, and lastly, exactly a century after the launching of the original scheme, Craig House was opened, an institution largely due to the inspired vision and foresight of Sir Thomas Clouston. It was, Professor Robertson said, perhaps the most beautiful building in Edinburgh from an architectural point of view, and occupied the most picturesque site in the city. The courage of the members of the Board, who planned such an institution, was striking. At the present day people seemed afraid to launch out into new enterprises, while thirty-five years ago the managers of the Royal Hospital at Morningside incurred a debt of nearly £150,000 to build a mental hospital worthy of the metropolis of Scotland and of the University of Edinburgh. The various institutions now controlled by the managers, if they were to be built at the present time in the same style, would cost nearly half a million pounds. Four years after they had willingly granted permission to the superintendent to deliver lectures on mental disease they gave a sum of £10,000 to the University to endow a chair of psychiatry.

The first special course of lectures on mental disease was delivered by Esquirol of Paris, and within the first three or four years at least three eminent Scotsmen attended Esquirol's lectures. One of these was Andrew Combe, who left money which helped to found the readership in psychology in Edinburgh University; another was Sir Robert Christison, who attended the lectures in 1821 and in the following year incorporated part of the information gained in his lectures on medical jurisprudence. Sir Alexander Morison attended the lectures in 1818 and was so impressed that five years afterwards he made a strong endeavour to get a lectureship or professorship on this subject instituted in Edinburgh. One of his proposals was that the visiting physicians at Morningside should deliver the lectures. The second proposal came from the principal of the University, Dr. Baird, who suggested that the College of Physicians should undertake to provide a lecturer. This request was not so surprising as it now seems, because at that date the duty of providing medical attendance to the patients at Morningside was gratuitously performed by certain Fellows of the College. Professor Alison, in giving evidence before a Royal Commission in 1826, suggested that there should be a professorship. None of these proposals were carried out at that time, although since then they have all come to pass. Having failed in his efforts to get any of his ideas adopted, Sir Alexander Morison delivered a course of lectures in Edinburgh in 1823, and he or his son subsequently lectured annually for the next thirty years. In 1853 he retired, but, as has been pointed out, when his lectures were about to cease the College of Physicians induced the managers at Morningside to allow Dr. Skae to lecture; subsequently, when Dr. Skae died, Dr. Clouston carried on the lectureship, and, as we all know, lectured most brilliantly and successfully.

Sir Thomas Clouston lectured for three or four years in association with Professor Laycock, who took a very keen interest in mental disease and regarded it as the most important special branch of medicine. Professor Laycock was succeeded by Professor Grainger Stewart, another great teacher. He, however, did not take the same interest in this special subject, nor did he possess the same knowledge of it as Laycock. Sir Thomas Clouston was then appointed University lecturer on mental disease. It is interesting to know that this lectureship was the first to be created in Edinburgh University, or perhaps in any Scottish university. There are now over 170 lecturers attached to Edinburgh University alone.

The authorities of Edinburgh University showed that their sympathy and interest in the teaching of this subject was not diminished when negotiations took place for the creation of a chair of psychiatry, and the University has the honour of being the first of the older universities to establish such a chair.

It would appear to be the fact, that the Edinburgh School of Medicine is the only school in the world in which special lectures on this subject have been continuously given for 100 years, and they trace their descent directly from Esquirol. After his retirement and death the lectures in Paris seemed to have lapsed; in London, about the middle of last century, they became somewhat irregular; the Germans did not begin to give special lectures on this subject till a later period. The Edinburgh School of Medicine therefore occupies an important and very honourable position in the history of this subject, and for this we are largely indebted to Sir Alexander Morison.

Morison Lectures in Edinburgh.

The first of the series of Morison lectures for the current session was summarized in these columns last week. The second and third lectures were delivered by Dr. Blackhall-Morison in the hall of the Royal College of Physicians, Edinburgh, on October 16th and 17th. Sir Robert Philip, President of the College, occupied the chair. In the second lecture Dr. Blackhall-Morison referred to psychology as an aspect of biology, commented upon the full growth of the Greek mind, and discussed especially the views of the Scottish philosophers, Brown, Hamilton, and Bain. The lecturer regarded sight and hearing as the master senses of man, and considered language as the result of external influences acting upon an innate aptitude in the human species, which had placed man in a class apart. He discussed the question whether mind is a living organism or merely a neural habit; and came to the conclusion, which was as old as Aristotle, that the mind was an active, living organism, connected with its parent organ, the brain, and possessed of properties of reproduction and metamorphosis as a natural process. He referred to the persistence of the human ego, and the views of transcendentalists like Herbart and Lotze. Experimental psychology was a special development of the study of the mind during the period with which he dealt. Recently there had been a new psychology specially associated with the names of Freud and Jung; this together with psycho-analysis he considered and criticized. In the third lecture he dealt with the mind diseased. He described the old views on psychiatry and the original primitive conditions for dealing with insane patients. He then dealt with the Act of 1774, the private madhouses, and the establishment of Commissioners

in Lunacy. The general progress of medicine had had great influence on the treatment of mental disease; and the evolution of bacteriology, endocrinology, and new conceptions as to eugenics and careful regulation of life were specially noteworthy in this connexion. The lecturer criticized the theories of the causation of mental disease and emphasized the supreme importance of sound education and care of the human mind in preventing its collapse. At the close of the lecture Dr. Blackhall-Morison presented for the acceptance of the Royal College of Physicians a portrait, painted by Philip Westcott, of his grandfather, Sir Alexander Morison, the founder of the lectureship, at the age of 82. In addition he tendered a *baculum* of office, suitably inscribed, to be used by successive Morison lecturers. The President, on behalf of the College of Physicians, gratefully accepted the gifts.

Royal Medical Society of Edinburgh.

The inaugural address of the 187th session of the Royal Medical Society was delivered on October 19th by Lieut.-General Sir William Leishman, K.C.M.G., F.R.S., Director-General of the Army Medical Service. Dr. T. M. Miller, Senior President of the Society, presided over the meeting, which was held in the Hall of the Society, and was largely attended by students and members of the Edinburgh teaching staff. Sir William Leishman spoke on the conditions and prospects in the Royal Army Medical Corps, and at the outset described in a humorous manner the "Pilgrim's Progress" of a supposed "Lieutenant Christian" through the Army Medical College, the dépôt of the R.A.M.C., his first command, his tour of foreign service, his senior course, and his ultimate advancement to a high position in the service. He pointed out that the policy now in force of withdrawing small garrisons and concentrating troops in larger centres would have a beneficial effect upon the medical service as well as on other departments. A number of small outlying hospitals had already been closed, and in the larger hospitals special subjects could be investigated. Accordingly for whatever branch of professional work an officer had a bent, he would in future have a chance of getting special instruction and special employment in the Army Medical Service. He paid a tribute to the work of the Service in different branches, and adverted to the fact that there had been fewer cases of enteric fever in the great war than the number of deaths from that disease in the South African war. A vote of thanks to the lecturer was proposed by Professor G. Lovell Gulland. On the following evening Sir William Leishman was entertained at dinner by the officers in the various Territorial units of the R.A.M.C. in the district.

Physical Education in Scottish Schools.

The second quinquennial report by Dr. L. D. Cruickshank, Chief Inspector of Physical Training to the Scottish Education Department, states that during the past five years there has been evidence of a growing appreciation of the scope and purpose of physical culture. The appearance of "drill" in school time tables tends to perpetuate in the minds of teachers and pupils a wrong conception of the subject, although the idea that physical education is synonymous with drill is no longer tenable. Dr. Cruickshank considers that the gymnastic lesson, while admittedly limited in scope, is in existing conditions the best means available for securing the maximum benefit to the health, development, and physical efficiency of the child. Dancing in schools has little in common with ballroom dancing, and should cultivate ease and grace of movement and develop control and rhythm. Swimming is commended as a form of exercise developing self-control and confidence. Health instruction, it is held, has not been considered with sufficient seriousness. Little has been attempted beyond supplementary classes dealing with the laws of health; but the aim should be to develop good habits rather than to give systematic theoretical instruction. As regards the debated question of sex instruction, the report holds that the best results are likely to be obtained along the indirect lines of habit formation, for in all health matters habits are better than knowledge. To encourage bookishness and sedentary habits is the worst possible training for the young. The report refers to the excellent work done by the teachers of the Dunfermline College for Physical Training and the training colleges. The total number of schools inspected was 1,798, and the criteria by which their effect on the pupils was classified were: (1) posture and carriage in general; (2) brightness, alertness, and vigour; (3) the type of exercises taught. The results as regarded primary schools in counties were that 59 per cent. of the children were "good" or "very good," 30 per cent. were "fair," and 10 per cent. were "poor." In most of the large burghs the physical condition of the children was much better; in Aberdeen 93 per cent. were "good" or "very good"; Edinburgh, 77 per cent.; Glasgow, 75 per cent. At Dundee, however, only 40 per cent. reached this high standard. The intermediate and secondary schools in burghs were also much in advance of similar schools in counties as regards excellence of physical training, and reached a standard of attainment in systematic physical exercises that is not likely to be greatly improved.

Mr. J. Hogarth Pringle, F.R.C.S.

On the occasion of the termination of his period of service as surgeon to the Royal Infirmary of Glasgow, Mr. J. Hogarth Pringle, M.B., F.R.C.S., was entertained at dinner in St. Enoch Station Hotel, Glasgow, by his former residents, on October 12th. Dr. H. Wright Thomson, who had been the first resident, was in the chair, and the dinner was attended by a large gathering of former residents from various parts of England and Scotland. In proposing the toast of the guest, the chairman mentioned that Mr. Pringle, who had been placed in full charge of wards in 1895 at an unusually early age, had served the Royal Infirmary as surgeon for the long period of twenty-eight years.

Central Midwives Board for Scotland.

A special meeting of the Central Midwives Board for Scotland was held recently for the hearing of penal cases; Dr. James Haig Ferguson was in the chair. In one case charges of being guilty of negligence, breaches of the rules, and failing to send for medical assistance in the case of a patient suffering from excessive haemorrhage were found to be proved, and the Board instructed the secretary to remove the name of the person from the roll, to cancel her certificate, and to prohibit her from attending women in childbirth in any other capacity. The cases of three other women charged with various breaches of the rules were considered. The Board resolved in each case that the midwife should be severely reprimanded and that a final decision should be postponed pending the receipt of the report from the local supervising authority on the conduct and methods of her practice during the next three months.

Correspondence.

THE UNIT SYSTEM IN SURGERY.

Sir,—It will be known to some of your readers that we have decided at the London Hospital to abolish the unit system on the surgical side, or rather to replace it by an extended and modified arrangement. As director of the surgical unit during the three and a half years of its existence, I should like to bring to general notice our reasons for this change, together with some observations on my own experiences.

The unit system was introduced in this country in 1920, with the idea of improving the teaching of medicine and surgery by placing it on a more uniform basis, and of advancing research. The fundamental principle was that certain men, who had attained some distinction in their profession, were to be selected, invited to withdraw from private practice, and by the payment of a salary enabled to devote the whole of their time to teaching and research. The plan was founded on the system prevailing in the Continental clinics, and it undoubtedly furnished an experiment of great interest. The experiment has, however, brought to light certain peculiar features of medical work in this country which to my mind render the system not

generally suitable for our requirements, at least in the province of surgery. It is of course quite possible that the difficulties which have arisen are felt with special force at the London Hospital, or are even peculiar to myself. But in any case they are real difficulties, and form a serious criticism of the whole system.

Withdrawal from private practice has necessarily a marked effect upon the mental outlook of the medical man. It narrows his horizon to the wards and laboratories of his hospital, and the difficulties and requirements of work in the outside world must in time be forgotten. The more complete the organization of his work, the more perfect the assistance he receives, the more will he tend to rely upon the mass of information placed before him and the less upon his own observation and interrogation of the patient. The diagnosis of a fracture will tend to become a matter of *x* rays, and a gastric case will only appeal to him as a source of test meals and opacities. Dealing as he does with patients of low mental power he is apt to feel that interrogation would only mislead him, whilst his estimate of the reaction of his patient to treatment will be quite inapplicable to individuals of another mental calibre. And yet he is teaching men who will have to cope with the very difficulties which his own surroundings tend to obliterate.

Again, one is apt to forget that a medical student does not walk the wards of a hospital entirely to learn medicine and surgery. He goes there in order to learn the practice of a profession of which technical knowledge is only a small part. It is his business to learn how to deal with human beings who are ill, and no small part of that business is to discover those from whom he may best obtain assistance when he is out in the world and on his own responsibility. Surely it is an impossible handicap to his teacher to limit him to the treatment of one class and to forbid him to consult with his old pupils.

It might, however, be supposed that in research at least the whole-time man would be safe, and I must say that for myself this was the one great attraction of the unit system. My experience has unfortunately brought disillusionment. Not only have I found my time absorbed in a routine the responsibilities of which it was impossible to devolve, but the very material for clinical study has eluded me. The clinical researcher depends for his material not upon the casual entries of the hospital, but upon cases sent to him from outside practitioners who know his special interests. Here at least I felt secure. The stream had always come; surely with more beds it would continue and expand. Instead of doing so it dwindled and sank to nothing. Apparently practice is too complex a thing for it to be possible for a practitioner to send his private patients to one consultant and his hospital cases to another. At any rate, I found myself with empty beds and no waiting list, appealing to my colleagues for cases to fill my wards. Moreover, a return to private work last year immediately brought a return to the old conditions, and the special cases which are so essential to research and to teaching began again to appear.

The unit system is said to have been borrowed from the Continent, but the position of a professor of surgery in a Continental clinic is entirely different. On the one hand he is the absolute and undisputed head of the whole clinic, including its laboratories, *x*-ray, and electro-therapeutic equipments. On the other hand, not only does he engage in private practice but he is the acknowledged leader of his profession, and all the most important and exceptional surgery of the district naturally passes through his hands. It is easy for him to organize through his assistants clinical demonstrations on the grand scale, and the teaching of surgery can be placed on a systematic basis which we have never achieved. But in most cases the teaching of the Continental student is limited to the lecture theatre; he may never enter the wards, and he rarely sees an operation. The personal touch of ward teaching, the close contact with his teacher which it affords, and its unrivalled opportunities for the direct study of the patient, are altogether lost, and the product of the system is more likely to be a brilliant student than a useful doctor.

In my opinion the teaching of surgery in this country is rather a cause for pride than for dissatisfaction, and no great revolution in its methods is required. But as surgery becomes more and more complex and its demands every day become more exacting, it is only reasonable that the teacher should have at his disposal the organized help of younger men. This has been our aim at the London Hospital, where to each of the five surgical firms a paid assistant has been attached. Each firm consists of a senior and a junior surgeon, and an assistant who is paid £400 a year for services on the basis of scheduled time. His duties will be to assist in the organization of teaching and in research, and only in exceptional circumstances will he be called upon to undertake the ordinary routine of hospital work. In this way we hope to improve our teaching, while preserving its personal basis, and to train up a group of younger men whose outlook extends beyond the horizons of to-day. And we hope to produce a combination of effort from our whole surgical staff such as may worthily maintain the great traditions of our hospital.—I am, etc.,

London, W., Oct. 18th. H. S. Souttar.

SPASM OF THE LARYNX.

Sir,—In the discussion on spasm of the larynx reported in the British Medical Journal of October 20th (p. 712) Sir J. Dundas-Grant is stated to have said, in referring to laryngeal vertigo, "This has generally been attributed to a sudden congestion of the nervous centres produced by the pressure resulting from the expiratory effort accompanying the cough." He then proceeded to state that according to *his* view the symptoms are really due to syncope. This I pointed out so long ago as 1884, and I would refer those interested to the *Transactions* of the Medico-Chirurgical Society of Edinburgh, vol. iii, or my book *Diseases of the Throat, Nose, and Ear* (third edition), pp. 227-28. I quote from the latter:

"The act of coughing consists of a deep inspiration followed by attempted expiration with partially closed glottis. In laryngeal vertigo, however, the closure of the glottis is complete and the whole expiratory effort is felt through the air contained in the lungs by the alveoli, the large blood vessels in the thoracic cavity and the heart itself. As a result syncope—or a tendency to syncope—is produced, and almost at the same moment the spasm of the glottis relaxes and the attack is over."

Although Sir J. Dundas-Grant has suggested a different and I think mistaken mechanism, the result arrived at is the same—syncope. I was therefore not a little surprised at his remarks, as I have had every reason to believe that the explanation of the phenomenon I suggested in 1884 has been generally accepted.—I am, etc.,

Harrogate, Oct. 20th. P. McBride.

ANTE-PARTUM HAEMORRHAGE DUE TO PLACENTA PRAEVIA, ASSOCIATED WITH ALBUMINURIA AND ECLAMPSIA.

Sir,—It is to be hoped that Dr. Lionel W. Bradshaw's memorandum (October 20th, p. 717) on his experience of the above condition will attract widespread attention, both because it is an interesting piece of evidence bearing on the question of the etiology of eclampsia, and also because it admirably exemplifies how observations and records made in the routine course of general practice may help scientific research.

To be appreciated fully, Dr. Bradshaw's note must be read in the light of the views on the etiology of eclampsia propounded in 1914 by my friend and colleague Dr. James Young.[1] Briefly, his view is that the toxins producing albuminuria and eclampsia are formed by massive necrosis of separated portions of the placenta, absorbed into the mother's blood through the unseparated portions. The association of albuminuria and accidental haemorrhage is a commonplace, and the usual interpretation placed upon it is that the haemorrhage and premature separation are due to the toxaemia. Young's view is that this is placing the cart before the horse, and, whether it may ultimately prove to be right or wrong, his view is certainly supported by cases, of which several have been observed in the Edinburgh Royal Maternity Hospital, in which the albuminuria has not developed until after the partial separation of the placenta had manifested itself by haemorrhage. Moreover, where the haemorrhage is followed by labour within a few

[1] *Trans. Edin. Obstet. Soc.*, vol. xxxix; Abstract, British Medical Journal, 1914, vol. i, p. 653.

hours, albuminuria is not observed, presumably because the toxins have not had time to be formed in the dying portion of the placenta. Young and Miller published a series of cases of placenta praevia associated with toxaemic symptoms,[2] and a further paper on a consecutive series of forty-nine cases of placenta praevia is in preparation by Dr. Miller, in which he records associated albuminuria in 37 per cent., and eclampsia in three cases. But further records are most desirable, and there must be many practitioners who could supply them.

One other point is perhaps worthy of attention—namely, that haemorrhage due to the separation of a placenta praevia at the sixth or seventh month of pregnancy is probably in reality an "accidental haemorrhage." That is to say, the fact that the placenta happens to be attached to the lower uterine segment is not to be regarded as a necessary factor in its premature detachment at that early stage of pregnancy. Our present classification of antepartum haemorrhage is mainly anatomical and clinical, and will certainly have to be discarded as our knowledge of the pathology of the conditions increases.—I am, etc.,

Edinburgh, Oct. 21st. R. W. Johnstone.

INSULIN AND DIURESIS.

Sir,—Cases apparently similar to that described by Dr. Lawrence (October 20th, p. 733) are not at all uncommon, although his seems to have been an unusually severe example, which had probably a much longer history than four years. Most of my cases exhibiting analogous characteristics have been young people, particularly girls about the age of puberty, or elderly folk past the climacteric. In many instances the glycosuria had been originally discovered by accident, but in some frequency of micturition and polyuria, or in the younger cases nocturnal enuresis, had been the first symptom. Often the older cases gave a history of glycosuria dating back for many years, in one for over twenty, and it would seem that the condition progresses, as a rule, very slowly and probably remains stationary when care is taken with the diet.

When I first differentiated the type clinically I found it difficult to account for the peculiarities exhibited and it was not until I had commenced making complete blood analyses in all cases that an explanation became possible. It was then found that these patients, unlike normal people and ordinary diabetics, increase the volume of fluid in the peripheral circulation as the sugar content of the blood rises after a meal, and that in the more severe examples the fasting blood is often abnormally dilute, although rapid variations are liable to occur. Apart from the effects of such variations on the amount of urine passed, they have an important bearing on treatment, for the true sugar content of the blood is not necessarily indicated by the percentage actually found—it may be considerably higher; hence such patients often excrete sugar in the urine on an apparently normal or subnormal blood sugar. Owing to this peculiarity I originally classified the milder forms as "renal glycosurias," but further experience showed that there were fundamental differences which distinguished them from glycosurias dependent upon excessive permeability of the kidneys for sugar. Eventually I had the opportunity of making a series of blood analyses in several typical cases of acromegaly and as they were all found to exhibit the same abnormalities as the type under consideration it seemed probable this, too, was due to disturbances in the functions of the pituitary. Observations upon animals have since confirmed this conclusion.

Treatment with insulin is not likely to be attempted in the earlier stages, if blood sugar estimations are made, but later when definite hyperglycaemia occurs, and particularly when secondary defects in the control of the pancreas over glycogenolysis develop, it may prove useful, but my experience has been that much larger doses are required than would be expected to prevent hyperglycaemia and glycosuria, diuresis is apt to persist, and relapse rapidly occurs when the injections are discontinued. There are many other points in cases of this type which cannot be dealt with here; those interested will find them fully discussed in another place (*New Views on Diabetes Mellitus*, Oxford Medical Publications). I may point out, however, that the occurrence of such cases tends to confirm the view I have long held that diabetes is a symptom complex arising from a variety of causes, and is not, as is now generally assumed, invariably a disease due to pathological changes in the pancreas.—I am, etc.,

London, W., Oct. 20th. P. J. Cammidge.

[2] British Medical Journal, 1921, vol. i, p. 486.

THE USE AND ABUSE OF OBSTETRIC FORCEPS.

Sir,—The chief point in Mr. Comyns Berkeley's paper on the use and abuse of obstetric forceps (October 6th, p. 600) is to leave things to Nature as far as possible. But how does Nature intend a child to be born? Certainly not with a woman continually lying on a bed. This is not how our primitive ancestors did it. We can learn something about this by reading (or seeing) how negroes do it. Dr. Fairbairn said, "The natural position is a squatting one, and I would like to hear if any of you have tried that posture in the hope of increasing the chances of natural expulsion." In the report of the discussion which followed no one is reported to have said that he had tried it, so I think it may be of some interest to report that I have.

Years ago, in the country, I had a case lying in bed in which the head had not advanced at all for about two hours. Then the woman said to me, "When I was in Wales the doctor used to get me to squat on the floor." So I immediately spread a sheet on the floor, the woman squatted, and the child was born there during the second pain. I have occasionally persuaded patients to do this, with the most excellent results. I am perfectly certain that a great number of forceps cases would be avoided and labours would be shorter if this were made the general practice, but I know the difficulty of persuading the woman of the present day to do it.—I am, etc.,

Reading, Oct. 20th. Norman H. Joy.

LARGE PLEURAL EFFUSION.

Sir,—The answer to the question in Dr. J. McOscar's memorandum on "Large pleural effusion" in your issue of October 20th (p. 718) is, that it is not unique. I have seen several large effusions both serous and purulent. In 1917 I was asked to see a case because the medical attendant fancied that he detected something wrong with the left side of the chest. The heart was well over to the right, and there were present all the signs of a large effusion in the left pleural cavity. By oxygen replacement, I withdrew seven and a half pints of serous fluid at one operation.

Wilson Fox[1] quotes the following cases: Lebert[2] withdrew in one operation eleven pints of pus. Hodges[3] withdrew thirteen pints of serum at one operation. Ogle[4] records a case where eighteen pints were withdrawn in two operations within forty-eight hours—four pints at the first and fourteen pints at the second operation. Lacaze Duthiers[5] gives a case where twenty pints were removed in one operation for empyema necessitatis.

The prognosis in these cases of large serous pleural effusion depends very largely on the after-treatment. Apart from some gross underlying condition such as malignant disease, they are always tuberculous, and if the patient is treated with the greatest care as a potential consumptive all may go well. But I am convinced that temperature and weight records and sputum examinations are essential, in addition to long convalescence.

It would be interesting to know what method of aspiration was employed, and whether the patient experienced any discomfort during the paracentesis. I should imagine that in this case the effusion was actually even greater than the seven and a half pints withdrawn, probably more like nine or ten pints, for usually physical signs and the radiograph show a considerable amount of residual fluid. The patient was fortunate in coming under Dr. McOscar's care when he did, for if these large effusions are left too long the mediastinum tends to become fixed, the pleura

[1] *Treatise on Diseases of the Lungs and Pleura*, p. 967.
[2] *Brustkrankheiten*, ii, 838.
[3] *Boston Med. and Surg. Journ.*, 1869.
[4] *Practitioner*, vol. xii.
[5] *Thèse*, p. 33.

thickened, and the lung non-expansile; a chronic effusion then results with a great probability of the subsequent development of a tuberculous empyema, especially after frequent tappings.—I am, etc.,

London, W., Oct. 22nd. F. G. CHANDLER.

SIR,—The case of pleural effusion described by Dr. McOscar of Buxton recalls to my memory a case which came under my care in 1911, when I was assistant medical officer in the Central London Sick Asylum, Hendon, N.W.

On returning from a holiday in June of 1911, I found a male patient in one of my wards looking rather cyanosed and breathless. He had not complained to either doctor or nurse, during my absence, of any condition requiring treatment. He suffered from phthisis, but was on full diet and did light work about the ward and in the grounds. I found dullness of the left side up to the clavicle. The same day I aspirated him with a Potain's aspirator and drew off 156 ounces of fluid before he began to cough slightly. It was, I recollect, a matter of regret to me that I could not get another 4 ounces.

Some six weeks later I drew off 65 ounces, and early in November, just before I left that institution, I again emptied his chest, on this occasion removing 56 ounces. Owing to changes in the staff and to my absence from London, I heard no more of the case until September, 1914, when I was informed that the man had taken his own discharge, in August, 1914, and was then considered to be practically free from any phthisis—in fact he was understood to have joined the army.

I have not heard of any greater amount being removed from the left pleural cavity.—I am, etc.,

JAMES OAG, M.A., M.B., Ch.B.,
Senior Assistant Surgeon,
October 22nd. Wigan Infirmary.

THE TREATMENT OF TUBERCULOSIS BY THE SPAHLINGER METHOD.

SIR,—I should like to add my testimony to that of Dr. Thomas Watts, M.P., and of others who have at various times written and spoken upon this subject.

Last August, in company with several professional colleagues, all of them particularly interested in tuberculosis, I spent a medical holiday in Switzerland. The first week we attended the admirable course of lectures and the clinical and special demonstrations arranged for the conference by Dr. Rollier at Leysin. We there saw some of the wonderful results obtained in surgical tuberculosis through the agency of heliotherapy combined with a return to natural conditions. It is not, however, with our Leysin experiences that this letter is concerned. From Leysin we went to Montana at the invitation of Sir Henry Lunn. Here we visited several sanatoriums for pulmonary tuberculosis and were informed by Dr. Bernard Hudson, the medical superintendent of the Palace Hotel Sanatorium, of several cases which he had successfully treated with Spahlinger's serum. Dr. Stephani, the proprietor of another sanatorium in Montana, was even more enthusiastic about the beneficial effects of the Spahlinger treatment upon a considerable number of his patients. We had the good fortune to meet M. Spahlinger one evening at the Palace Hotel, and he invited us to Geneva to inspect his laboratories and to see some of the treated patients. Several members of the party availed themselves of the opportunity. We were, one and all, impressed by M. Spahlinger's bacteriological knowledge and by the freshness and originality of his ideas and methods. He told us the broad principles of the preparation of his serums, showed us all over his laboratories, which are as well equipped as any that we had seen, and moreover contain many ingenious devices which all testify to his originality of thought. He has a staff of ten assistants and laboratory attendants, all of whom he pays out of his own pocket. Not only has he refused fees from patients, as Dr. Watts states in his letter, but I am credibly informed that his researches during the past twelve years have swallowed up the whole of his father's, his wife's, and his own fortunes, and that unless substantial financial aid is forthcoming by the end of the present year the whole establishment must close down.

M. Spahlinger showed us his experimental animals (horses, cows, monkeys, rabbits, guinea-pigs, etc.), and among them a cow which he had immunized against tuberculosis, and had subsequently inoculated with living tubercle bacilli, without harming the animal. He took us round Geneva to see several former patients whose history, temperature charts, and x-ray photographs showed that they had been profoundly ill with phthisis, and as a result of his treatment were now cured and carrying on their avocations in various business establishments. Several tuberculosis officers were members of the party and examined the patients, who, they all agreed, were apparently cured of their active phthisis.

The profession is always jealous, and rightly so I think, of the activities (in the domain of medicine) of non-medical individuals, but one can recall several instances where scientific work of the highest order and importance to medicine has been done by non-medical persons. Pasteur, the founder of modern bacteriology and one of the greatest benefactors of mankind, was not a doctor; several of our biochemists are not medical men, and there is at least one radiologist in London who is not a medical man, whose work is as excellent as that of any medical radiologist. The work which M. Spahlinger has accomplished and is still doing may be in the same category.

The problem of consumption and of tuberculosis generally is one of international importance, and in spite of all the advances in prevention and treatment that have been made in recent years it is notorious that there remains an appalling amount of mortality, morbidity, and invalidism, to say nothing of the economic wastage, resulting from the ravages of the tubercle bacillus. Scientific medicine does not recognize national boundaries and frontiers. It seems to me that a problem of this magnitude and international importance should be investigated—and at once—by a small international commission of experts. International financial aid should be given to M. Spahlinger so that he may proceed forthwith, unembarrassed by financial difficulties, with the preparation of his serums and vaccines on an adequate scale for extended trial in various countries. The money that would be required would be small compared with the enormous economic cost of the mortality and invalidism resulting from tuberculosis, to say nothing of the toll of human suffering which it exacts. In the event of M. Spahlinger's claims being substantiated, he will indeed prove to be a benefactor of mankind, and his idealism will be justified.—I am, etc.,

London, W., Oct. 15th. DAVID NABARRO.

SIR,—It is, as Dr. Cheater points out in your issue of October 20th, an honourable tradition in the profession that whosoever discovers a new remedy or improves upon an old one should publish his theory and technique. The tradition has been established in the interests of the public, but if it should happen that the interests of the public are better consulted by a temporary withholding of details, then the tradition should clearly remain unobserved. This attitude was very properly and wisely adopted in the case of insulin, and if it had been adopted in some other cases it might have been better for the credit both of the work and the worker. I am one of those—and they are many—who have strongly advised M. Spahlinger not to allow himself to be beguiled into a premature disclosure of his complete technique. Such disclosure should in our view be delayed until a standard has been established, and this cannot be done until the complete serum and vaccines are again in being and their efficacy demonstrable. To adopt any other policy would in our view be to court disaster. There would be nothing to prevent unscrupulous persons from exploiting worthless nostrums, said to have been made according to the Spahlinger methods—which has indeed even now been done.

My friend Dr. Watts is perfectly right in saying that there is no secrecy. The serum is a horse serum prepared in a particular way and taking four years to make; the vaccine is an ordinary vaccine prepared from the whole bacillus—fatty envelope and all. Spahlinger's work is merely an evolution along well established lines and according to generally accepted principles. But he wisely withholds the details of his technique for the reasons above stated. It would be contrary to the public interest were he to explain them at this juncture.

I know nothing about M. Spahlinger's dealings with the

Ministry of Health, but I am very much surprised to learn from Dr. Cheater's letter that he refused to allow representatives of the Ministry to investigate his treatment. Such has never been his practice, for he has welcomed to his laboratory accredited medical representatives from the Governments of Australia, New Zealand, Canada, and other overseas Dominions, copies of whose reports I have seen and studied. Incidentally, I may say that these reports are most eulogistic.—I am, etc.,

London, W., Oct. 20th. LEONARD WILLIAMS.

VITAMINS AND CHLOROPHYLL.

SIR,—In a letter on the above subject Sir Patrick Hehir (October 20th, p. 733) states that Miss Harriette Chick and Miss Margaret Hume discovered that germinating grain and pulse contain antiscorbutic vitamins after the grain has sprouted. It should, however, not be forgotten that in 1908 Dr. Axel Holst of Christiania showed that scurvy was produced in guinea-pigs by a diet of bread and dry cereals, but not if raw carrot was added; on a diet of compressed dried potato, but not if cabbage juice was added; and on a diet of dried barley and water, but not if the barley was allowed to sprout first.—I am, etc.,

London, W., Oct. 22nd. EDMUND CAUTLEY.

DIAGNOSIS OF SMALL-POX AND CHICKEN-POX.

SIR,—At the present time there is a great deal of discussion on the diagnosis of small-pox and chicken-pox, and a point of some interest arises—namely, that the presence of a good vaccination mark may alter one's opinion, the mark being evidence, and valuable evidence, of vaccination, and therefore protection.

Many years ago I drew attention in the *Medical Press and Circular* to the condition of the scar as found on several thousands of school children varying in age from 3 to 14; in many of the elder children the scars were found with difficulty. I am finding the same thing in older people whom I have since vaccinated; this modifies my views as previously stated.

The present method of vaccinating avoids cross-cutting and does away with the necrosis of superficial areas of the skin, and the resulting scar appears to me to last, distinctly, a very much shorter period, and thus important evidence as to the success of the vaccination tends to be lost.—I am, etc.,

Sunderland, Oct. 15th. EUSTACE THORP, O.B.E., L.R.C.S., D.P.H.

Universities and Colleges.

UNIVERSITY OF OXFORD.

AT a congregation held on October 18th the degree of Bachelor of Medicine (B.M.) was conferred on T. A. Brown.

The following members of the Medical School have been elected to scholarships at the undermentioned hospitals:

Guy's Hospital.—War Memorial Scholarship, £80, D. Lurie. University Students Open Scholarship, £80, W. D. B. Read.
London Hospital.—Second University Scholarship, V. H. Brink.
King's College Hospital.—Burney Yeo Scholarship, J. W. de W. G. Thornton, J. A. Eyres.
St. Mary's Hospital.—University Scholarships, £200, R. B. Bourdillon, P. C. Mallam.
St. George's Hospital.—University Scholarship, H. A. Bywor'h.
Westminster Hospital.—University Scholarship, £80, S. Segal.

UNIVERSITY OF CAMBRIDGE.

THE following candidates have been approved in both parts of the examinations indicated:

DIPLOMA IN HYGIENE.—*A. M. Kamal, M. E. Sebaiy.
D.P.H.—L. S. Ahluwalia, G. A. Back, W. Bird, J. McP. Campbell, *J. R. Chandhri, *H. L. Cronk, R. Cunningham, Mary A. Grant, Alice J. Gray, Susan M. S. Jamieson, H. D. Kelf, J. McW. McDonald, W. C. Mathur, *†‡A. C. Munro, C. E. R. Norman, A. C. Paterson, R. N. Raja, A. M. Ramzy, †G'adys H. Randall, A. El-H. Sadek, M. F. Saldanha, A. M. Seerval, Florence G. Sherry, Isobel M. Smith, Katherine C. Spence, B. Suggit, Nora I. Wattie, R. Weaver, A. D. Whitelaw, Catherine B. Wilson.

* Distinguished in the application of Sanitary Science.
† Distinguished in the Principles of Hygiene.
‡ Distinguished in Bacteriology.

UNIVERSITY OF LONDON.

Matriculation Examination.

AT the September matriculation examination 58 candidates were placed in the first division and 324 in the second division; in addition 36 gained the supplementary certificate for Latin. At the matriculation examinations held overseas (June, 1923) at Colombo 3 candidates were placed in the first division and 16 in the second division; 3 passed in the second division at Jaffna, 2 in the second division at Kingston, Jamaica, and 1 in the first division at Barbados.

LONDON HOSPITAL MEDICAL COLLEGE.

The following awards have been made: "Price" University Scholarship in Human Anatomy and Physiology: H. L. Green; Proxime Accessit, V. H. Brink (awarded a second scholarship).

ROYAL COLLEGE OF SURGEONS OF ENGLAND.

THE annual meeting of Fellows and Members of the Royal College of Surgeons of England will be held at the College, Lincoln's Inn Fields, W.C., on Thursday, November 15th, at 3 p.m.

ROYAL COLLEGE OF SURGEONS OF EDINBURGH.

AT the annual meeting of the Royal College of Surgeons of Edinburgh on October 17th Sir Harold J. Stiles was elected President and Sir David Wallace Vice-President, and Mr. Alexander Miles Secretary and Treasurer.

The following 13 successful candidates out of 44 entered having passed the requisite examinations have been admitted Fellows:

S. C. A'agappan, W. M. Ash, F. W. W. Baillie, E. B. Barrett, H. C. Braysshaw, R. C. Clifford, B. T. Cullen, M. D. David, A. Gallichy, L. J. Middleton, D. A. Mitchell, N. A. M. Petersen, H. B. Scott.

CONJOINT BOARD IN SCOTLAND.

THE examinations of the Royal College of Physicians of Edinburgh, the Royal College of Surgeons of Edinburgh, and the Royal Faculty of Physicians and Surgeons of Glasgow have just concluded at Edinburgh.

The following candidates have been approved at the examinations indicated:

FINAL EXAMINATION.—*Medicine:* R. F. Kerr, A. Adefolu, V. P. Thiyagaraja, A. W. H. Noble, P. S. H. Masters, J. Kirkness, J. N. Dey. *Surgery:* A. Raff, V. Vaithialingham. *Midwifery:* A. Raff, Annie H. Sutherland, A. Adefolu, V. P. Thiyagaraja, G. C. Philips, V. Vaithialingham, S. Thambipillai, C. A. Barrow, J. McAuley, Wilhelmina C. Storrie, Elizabeth Clark, W. Melrose. *Medical Jurisprudence:* W. T. Baker, T. G. S. Harkness, J. B. Stromier, Irma E. L. Mackenzie, J. Houston, J. K. Hunter, M. M. El-Makkawi, J. H. MacAlpine, J. Harkness, N. T. Yusif, D. L. Crawford, B. F. Home, H. A. Newton.

The following candidates having passed the Final Examination were admitted L.R.C.P.E., L.R.C.S.E., L.R.F.P. and S.G.:

J. W. Ridley, J. Ryan, D. D. S. Outschoorn, J. S. Allan, S. H. Tan, A. H. Stephenson, S. L. Navaratnam, R. G. Melrose, J. R. Whitaker, C. F. Brkenstock, A. B. Williamson, D. S. M. E. Perera, Phyllis M. Walker, A. Ross, C. M. Hinds, A. Bury, C. L. S. Ferdinands, A. L. Tinto, A. Gillies, H. Hoffmann, G. A. P. McCorey, W. R. Robertson, J. G. Thomas, R. M. MacKinnon, H. E. Schokman.

The following candidates having passed the requisite examinations have been admitted Diplomates in Public Health:

W. S. Macdonald, Elizabeth N. Thompson, A. R. Lester, J. F. Seale, W. Campbell, H. Nichol, R. G. Shaw, Dorothea I. Baird, P. Hutchison, Katharine J. Guthrie, J. S. McL. Gray, J. L. Halliday, Margaret A. Galbraith, W. McKie, Peggy L. Mitchell, J. G. Gill, K. A. Macrae, F. D. Murchison Beaton, Katrine Dunn, D. T. Richardson, Catherine Hill, Helen Campbell, G. W. Murray, C. M. Smith, and R. Wiggins.

The Services.

DEATHS IN THE SERVICES.

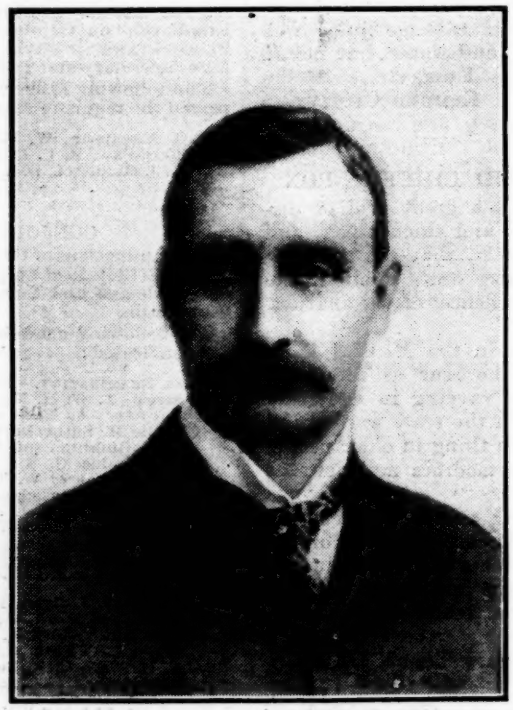
Captain Lionel Baker Jones, Indian Medical Service, was killed by a sniper, while motoring on duty, on the Loralai-Harnai road, Baluchistan, thirteen miles from Harnai, on October 1st. He was born on July 24th, 1895, the son of Dr. Samuel Baker Jones of Brynfield, Reynoldstone, Swansea, and entered Edinburgh University as a medical student in October, 1914. On May 31st, 1915, he enlisted as a private in the Inns of Court O.T.C., and on September 16th, 1915, received a commission as 2nd Lieutenant in the Welsh Regiment (41st Foot) (6th Territorial, Glamorgan, Battalion), being promoted to lieutenant on July 1st, 1917. He was seconded for service in the Royal Air Force on August 7th, 1916, and on May 26th, 1917, was decorated with the Military Cross. After being demobilized on July 31st, 1919, he resumed his medical studies and graduated M.B. and Ch.B. Edinburgh in 1922. On January 20th, 1923, he joined the I.M.S., being appointed direct as captain on account of his four years' war service. He was engaged to be married to Dr. Jean Riddell Purves, who graduated at Edinburgh in July, 1923; she was on her way out to India to be married at the time, and landed at Bombay the day after Captain Baker Jones's death.

Obituary.

WILLIAM EDWARD ASHLEY CUMMINS, M.D., M.CH.,

Professor of Medicine, University College, Cork.

WITH the death of Professor W. Ashley Cummins of Cork on October 18th after a brief illness, a great figure in Irish medical education passes away, and his loss will be mourned, not only in the city and county where his life of service and devotion was spent, but by Cork graduates all over the world. The eldest son of the late Dr. William Jackson Cummins, Ashley Cummins was born at Blackrock, Cork, in February, 1858. He entered Queen's College, now University College, and soon distinguished himself both as a keen sportsman and a successful student. His performances in cycle racing and in the football field brought him to the front rank in College games, and finally he secured his cap in International Rugby football, playing for the Irish team in 1879, 1881, and 1882. He was also a keen yachtsman and his wonderful knowledge of the intricacies of wind and tide in Cork Harbour gained him many victories and made him famous amongst the yacht-racing fraternity of Queenstown.



Photograph by] [Guy and Co., Ltd., Cork.

PROFESSOR W. E. A. CUMMINS.

But with all his success at sport, he was at the same time devoting himself with untiring energy to his work and laying the foundations of the singular clinical acumen and skill which was to distinguish him in his professional career. In 1879 he took the M.D., M.Ch., and L.M. of the Queen's University of Ireland with First Class Honours and the Gold Medal, and he gained the L.A.H.Dublin in the following year; he was the Senior Scholar in Surgery and an Exhibitioner of Queen's College, Cork. After holding a house appointment he started practice in his native city, and his success was assured from the first. With increasing experience his clinical skill rapidly matured and his practice grew to such considerable proportions as to strain his great fund of energy to the utmost. But, while he loved his practice, it was in the teaching of clinical medicine that he found his greatest delight and success. His bedside demonstrations at the Cork Union Hospital were things to be remembered, and they drew an ever-increasing number of students to that institution, which soon received University recognition as a centre for clinical instruction.

When, in 1897, he became Professor of the Practice of Medicine at University College, Cork, he found the greatest interest of his life in an appointment which gave him full scope for his special bent. It is safe to say that his remarkable powers as a teacher proved the source of inspiration to many a Cork student since distinguished in his profession; and his high character and self-forgetting devotion to duty made him beloved and respected by all.

Though so much occupied by the claims of teaching and practice, he still found time to take a prominent place in the professional life of the city and, indeed, of Ireland. He was at one time President of the Cork Medical and Surgical Society, and was also ex-President of the South of Ireland Branch of the British Medical Association. He was senior surgeon to the County and City of Cork Hospital for Women and Children; senior medical officer Cork District Hospital; consultant physician to the Lying-in Hospital, the Eye, Ear, and Throat Hospital, and the Home for Incurables, Cork; examiner in medicine to the National University of Ireland, and, at one time, examiner in medicine to the Apothecaries' Hall, Ireland. With all this, his interest in College sports never flagged, and his love of Rugby football was a bond that kept him in close touch with the students of all the Faculties of University College, Cork.

He married, in 1884, Miss Jane Hall, daughter of the late Mr. Robert Constable Hall of Rockliffe, co. Cork; and it was in his family life that he revealed the most beautiful and lovable side of his character, a precious memory to those now left to mourn his loss. He leaves a large family of sons and daughters, of whom several, including Dr. Robert C. Cummins, Dr. N. M. Cummins, Dr. Ellice Hearn, and Dr. Grace Cummins, have embraced their father's profession. All his six sons served in the European war, two gaining the Military Cross for gallantry, and two fell in action. His brother is Colonel S. Lyle Cummins, A.M.S.(ret.), David Davies Professor of Tuberculosis in the Welsh National School of Medicine, Cardiff.

The sympathy of all who knew him will go out to his wife and children in their hour of sorrow; but they should take comfort in the thought that the work and example of Ashley Cummins will not soon be forgotten.

Dr. R. H. POWERS of Southend-on-Sea died on Sunday, October 7th, after an attack of lobar pneumonia that lasted only three days. Born in 1868, Richard Henry Powers was educated at Cheltenham College and St. Mary's Hospital, and obtained the English Conjoint diploma in 1898. He practised at Brigg till 1910, when he joined Dr. Sellors in partnership at Southend-on-Sea. During the war—unfit for active service—he was unwearying in his attendance at the Glen Auxiliary Hospital and in the care of troops under his medical charge. An overflowing congregation at the funeral service, including detachments of the 28th and 34th British Red Cross and St. John's V.A.D.'s, and a numerous gathering of local medical men and nurses, testified to the esteem in which he was universally held. Dr. Powers's unselfish and unceasing devotion to his work remains an inspiring memory. He leaves a widow, daughter and son.

Dr. ALBERT THEOPHILUS DUKE, D.S.O., late Major R.A.M.C.(T.C.), died at New Milton, Bournemouth, in September, aged 57. He was educated at Cheltenham College; at Cambridge, where he graduated B.A. in 1888 and M.A. in 1892; and at St. George's Hospital. He took the L.S.A. in 1891, and the M.R.C.S. and L.R.C.P.Lond. in 1892. He afterwards went to Australia, and accompanied the Australian forces to South Africa, where he served as medical officer of the Queensland Mounted Infantry, was mentioned in dispatches and gained the D.S.O. at Eland's River; he received also the Queen's Medal with two clasps. In August, 1914, he rejoined the army as a temporary lieutenant in the R.A.M.C., became captain after a year's service, and major on September 26th, 1915; he served in the advance on and retreat from Mons, and later in England, in charge of the clearing hospital at Eastleigh. After the war he served in the Ministry of Pensions department at Southampton till his death. He was a member of the Bournemouth Town Council, and a prominent local Freemason, being a past Worshipful Master of Boscombe Lodge.

We regret to record the death, on October 2nd, of Dr. GEORGE LIVINGSTONE MITCHELL, of Redditch, Worcestershire, from scarlet fever, contracted from a patient he was attending. Dr. Mitchell, who was only 29 years old, was

educated at the University of Glasgow, and also at Birmingham and London; he took the L.M.S.S.A.Lond. in 1918 and graduated M.B., Ch.B.Glasgow in 1921. When he qualified he became surgeon lieutenant in the navy, and was eye specialist at the Royal Naval Hospital, Plymouth. After holding the appointment of senior house-surgeon at the Guest Hospital, Dudley, and assistant surgeon to the Sunderland Eye Infirmary, he went into practice at Redditch, where he was appointed honorary surgeon to the Smallwood Hospital.

Mr. Harry Michie of Nottingham died suddenly from cardiac syncope following exertion, while out with a shooting party at Flintham on October 13th, aged 68. He was born at Edgell, Forfarshire, and received his education at the University of Aberdeen, where he graduated M.B., C.M. in 1881. After spending a few months in Nottingham as assistant to Dr. Owen Taylor he returned to Scotland, but came back to Nottingham in 1884, when he started practice on his own account, and his abilities as a surgeon were soon recognized. For thirty-seven years he was surgeon to the Samaritan Hospital for Women, Nottingham, and was an ex-president of the Nottingham Medico-Chirurgical Society.

Medical News.

Sir Arthur Keith, F.R.S., will deliver the William Mitchell Banks Memorial Lecture in the Medical School, University of Liverpool, on Thursday, November 1st, at 4 p.m. The subject is the origin and nature of hernial formations. The lecture is open to members of the medical profession.

The Edinburgh University Club of London will hold its 200th dinner at the Connaught Rooms on Friday, November 23rd, at 7.30 p.m. The club, founded in 1864, has steadily thrived, and now has nearly 650 members. The president of the club, the Right Hon. the Earl of Balfour, K.G., has promised to take the chair on this important occasion, and there will be a very large attendance of members and their guests.

Professor Strandberg of Copenhagen will deliver a lecture at the Royal Society of Medicine on Monday, December 3rd, at 5.30 p.m., on the results of the treatment of rhino-laryngological tubercle in the Finsen Light Institute at Copenhagen.

We may remind readers that the first social evening of the Royal Society of Medicine for this session will be held on Tuesday next at 8.30, when the President and Lady Hale-White will hold a reception. At 9 o'clock the Society's gold medal will be presented to Professor Gowland Hopkins, F.R.S., who will give a short address on stimulants of growth. The principal reading room will be closed at 5, but readers will be accommodated in other rooms.

We are informed that the University of London has accepted a gift of £10,000 from Mr. Geoffrey E. Duveen, to found a chair of otology, and that he also intends to present £15,000 to University College Hospital for the provision of the most complete and modern treatment of the deaf. The gifts are in memory of the donor's father, Mr. Henry J. Duveen, one of the founders of the art firm of Duveen Brothers.

The annual dinner of the West Riding Association of the Graduates of the University of Edinburgh will be held in the Great Northern Hotel, Leeds, on Friday, November 9th, at 7 p.m. It will be preceded by the annual general meeting at 6.30. Further information may be obtained from the Honorary Secretary, 103, Manningham Lane, Bradford.

The fortieth annual dinner of the past and present men students of the Leeds School of Medicine will be held at the Queen's Hotel, Leeds, on November 16th, at 7 p.m., when Mr. Carlton Oldfield will preside. Tickets (10s. each) may be obtained from the honorary secretaries, Mr. A. M. Claye and Mr. W. E. Dornan, at the Medical School, Leeds.

A course of four lectures on the treatment of injuries of the long bones produced by accident or disease will be given at Guy's Hospital Medical School (London Bridge) by Mr. E. W. Hey Groves, F.R.C.S., professor of surgery in the University of Bristol, on Thursday, Friday, Monday, and Tuesday, November 8th, 9th, 12th, and 13th. The lectures will be given at 5.30 p.m. each day, and at the first the chair will be taken by the Vice-Chancellor of the University of London, Mr. H. J. Waring, F.R.C.S.

Dr. William F. Shanks, who graduated B.Sc. with special distinction in physiology in the University of Glasgow in 1913, and M.B., Ch.B. in 1915, has been appointed Professor of Physiology at the University of Leeds.

Dr. Leonard Hill, F.R.S., will deliver a lantern lecture on climate and the treatment of consumption at the meeting of the North-Western Tuberculosis Society to be held at the Tuberculosis Department, Joddrell Street, Hardman Street, Deansgate, Manchester, on Thursday, November 1st, at 3 p.m. Medical practitioners are invited to attend.

A series of six clinical demonstrations of types of mental disease will be given at the Maudsley Hospital, Denmark Hill, S.E., by the Medical Superintendent, Dr. Edward Mapother, on successive Wednesdays, commencing November 7th, at 2.30 p.m. The series will be illustrated by numerous cases from the Maudsley Hospital and the mental hospitals of the county. The following is a syllabus of the lectures: (1) Congenital and early types, conditions associated with endocrine disorders. (2) Psychoses associated with epilepsy and with syphilis. (3) Psychoses associated with senility, with arterio-sclerosis, and with certain organic diseases of the brain. (4) Alcoholic psychoses; dementia praecox. (5) Delusional states. (6) States of mania and depression. The fee for the series of six demonstrations is 1 guinea, payable at the hospital.

The third general interchange of health officers arranged by the Health Section of the League of Nations is at present taking place in the United States. Representative health officers from Great Britain, France, Italy, Russia, Poland, Spain, Holland, Belgium, Greece, Jugo-Slavia, Germany, Switzerland, Norway, Mexico, Brazil, Chili, San Salvador, and Canada arrived in America during the first week of September and will remain there for three months. At first the delegates were in Washington for some three weeks, studying the national health organization of the United States Public Health Service. At the close of this course of study the health officers divided into three groups, which proceeded to different parts of the United States to study the organization of the State and local health departments; later the groups will proceed to various cities and smaller towns to study their health administration. Among the delegates Britain is represented by Dr. T. Carnwath, of the Ministry of Health, and Dr. Charles Porter, medical officer of health for Marylebone; Canada is represented by Dr. M. M. Seymour, Deputy Minister of Public Health, Saskatchewan. The delegation is accompanied by Dr. Norman V. Lothian, of the Health Section of the League of Nations.

Dr. Henry Jackson has accepted the invitation to continue in office for the third year as mayor of Wandsworth.

The corner stone of the Elsie Inglis Memorial Hospital for Women and Children at Edinburgh was laid on October 19th by Lady Novar, wife of the Secretary for Scotland, who paid a warm tribute to the heroic work in Serbia performed by Dr. Elsie Inglis, founder of the Scottish women's hospitals.

Mr. A. R. Anderson, C.B.E., F.R.C.S., late honorary surgeon to the Nottingham General Hospital, was entertained by his medical friends at dinner on October 11th, when he was presented with a silver tray and tea service as a mark of esteem. Dr. Jacob in making the presentation referred to Mr. Anderson's great devotion to the welfare of his hospital patients during a period of forty years.

The Dental Board of the United Kingdom (44, Hallam Street, London, W.1) asks us to state that in consequence of the experience of last year notices reminding practitioners of the necessity of paying the fee for the retention of their names on the *Dentists Register* will not be issued until the beginning of December.

The first impression of *Medical Axioms, Aphorisms, and Clinical Memoranda*, by Dr. James A. Lindsay, reviewed in these columns on March 10th, 1923 (p. 422), having been sold out, the publishers, Messrs. H. K. Lewis and Co., Ltd., announce the publication of a second issue. The author has taken the opportunity of adding a few new axioms and aphorisms, and of omitting or amending a few others.

The programme of the National Milk Conference on pasteurization, which, as was recently announced in the Journal (September 15th, 1923, p. 489), will be held in the Guildhall, London, on November 21st, has now been completed by the addition of the names of Professor H. R. Kenwood, Miss Harriette Chick, and Dr. W. E. Elliot, M.P., to those who will open discussions on different aspects of pasteurization. The conference is being organized by the National Clean Milk Association, 3, Bedford Square, W.C.1.

Drs. G. E. H. Roger, dean of the Paris Faculty of Medicine, J. L. Faure, professor of surgery in the same faculty, L. J. Hugouenq, honorary dean of the Lyons Faculty of Medicine, Maurice de Fleury, member of the Academy of Medicine, and A. Lumière have been made Commanders of the Legion of Honour.

Letters, Notes, and Answers.

As, owing to printing difficulties, the JOURNAL *must be sent to press earlier than hitherto, it is essential that communications intended for the current issue should be received by the first post on Tuesday, and lengthy documents on Monday.*

AUTHORS desiring reprints of their articles published in the BRITISH MEDICAL JOURNAL are requested to communicate with the Office, 429, Strand, W.C.2, on receipt of proof.

THE postal address of the BRITISH MEDICAL ASSOCIATION and BRITISH MEDICAL JOURNAL is 429, Strand, London, W.C.2. The telegraphic addresses are:

1. EDITOR of the BRITISH MEDICAL JOURNAL, *Aitiology Westrand, London*; telephone, 2630, Gerrard.
2. FINANCIAL SECRETARY AND BUSINESS MANAGER (Advertisements, etc.), *Articulate Westrand, London;* telephone, 2630, Gerrard.
3. MEDICAL SECRETARY, *Mediscera Westrand, London;* telephone, 2630, Gerrard. The address of the Irish Office of the British Medical Association is 16, South Frederick Street, Dublin (telegrams: *Bacillus, Dublin*; telephone, 4737, Dublin), and of the Scottish Office, 6, Rutland Square, Edinburgh (telegrams: *Associate, Edinburgh*; telephone, 4361, Central).

QUERIES AND ANSWERS.

"S. N. B." asks for references to clinical articles dealing with intravascular streptococcal haemolysis.

TINTED LENSES FOR CATARACT.

"E. E. M." (Bournemouth) writes: By the "colour therapy" of cataract E. H. W. (October 20th, p. 737) may perhaps mean the provision of tinted lenses with a view to the exclusion of ultra-violet light. The comfort often experienced by cataract patients from tinted spectacles has been known to ophthalmic surgeons longer than I can tell, but the scientific basis for the prescription of Fieuzal or Crookes's glass has only been discovered in comparatively recent years. In America Dr. W. S. Burge and Dr. A. S. Neill published in 1915 some remarkable experiments with ultra-violet light, proving that the normal lens is, by virtue of its fluorescence, resistant to its ill effects. Healthy eyes therefore need no protection from ordinary daylight. When, however, a lens is immersed in a dilute solution of a calcium, sodium, or magnesium salt (all three of which are contained in excess by cataractous lenses) or of dextrose the natural fluorescence is reduced and the lens can no longer resist the opacifying effect of ultra-violet light. The conclusion is obvious that besides medical treatment directed to correct the constitution and increase the health of the lens some variety of anti-actinic glass should be worn, at least out of doors, in cases of early cataract.

INCOME TAX.

Deduction for Rent, Rates, etc.

"A. H. L. T." is assessed in respect of a practice in the West End of London, and has been informed by the local inspector of taxes that the deduction in respect of rent, rates, lighting, etc., which has hitherto been on a basis of two-thirds, will be reduced to the basis of one-half.

*** Whether the alteration is justified depends on the exact facts of the case. Where the premises used for the practice are in such localities that exceptional rents have to be paid, an abnormally high proportion is justified—in Harley Street, to take an extreme case. Perhaps the best way of approaching the question is to consider whether the remainder (one-third or one-half, as the case may be) of the rent, rates, etc., fairly represents the value of the private residential portion of the premises. The £4 legal expenses is not allowable if, as we assume, they were incurred in the initial hiring of the garage by "A. H. L. T."

Partnership Receipts.

"D. D."—A took B into partnership as from October 1st, 1922, on a one-third basis, which was increased to one-half as from January 1st, 1923. On October 1st, 1923, A retired and B succeeded to the whole practice. Each partner provided his own means of locomotion at his own expense. How should they divide the tax payable for the year ending April 5th, 1924?

*** A is liable on the basis of one-quarter of the gross average profits less one-half of a year's expenses of his own locomotion—less, of course, the personal allowances applicable thereto; and B is liable on the balance of the gross assessment less *his* personal allowances.

Motor Car Transactions.

"C. F. R." bought a second-hand T. car in 1917 for £150; he sold it in 1923 for £85, buying a new B. car for £540. What allowance is due?

*** The cost of *replacement* is the 1923 cost of a T. car of similar power and condition to the one purchased in 1917 (clearly a difficult matter to estimate), less the £85 received. To allow £540−£85 would involve allowing an outlay on *improved* equipment. The inspector offers an allowance of £260, which would be right on the assumption that a similar second-hand T. car would cost £260+£85=£345—that is, more than twice the 1917 cost. We advise "C. F. R." to accept the offer.

LETTERS, NOTES, ETC.

UNITED HOSPITALS WINTER SPORTS CLUB.

DR. J. DUNCAN LYLE, Maidenhead (Honorary Secretary of the United Hospitals Winter Sports Club), writes: I trust that you will assist me to bring this club to the notice of your readers. The club was founded to encourage winter sports amongst past and present students of all recognized medical schools in the United Kingdom. As the Grand Hotel, Griesalp, Bernese Oberland, was considered a success last season, it has been decided to make this the club hotel for 1923–24. Our President, Lord Dawson, has very kindly consented to give a trophy for a ski race at Griesalp between January 6th and 13th. Particulars can be obtained from the manager of the hotel.

HERPES, VARICELLA, AND "W. G."

DR. B. H. PAIN (Southborough, Kent) writes: I have a patient, a finely built man, aged 76, suffering from herpes zoster and also a mild attack of varicella. The herpes is all down the course of the great sciatic nerve and its branches, there being nine distinct patches of herpes: on the buttock, back of thigh, outside of leg and ankle, and a patch on the dorsum of the foot. He has had much pain down the leg, both before the herpes developed and after. When I first saw him the herpes was present and he had one typical varicella vesicle on the chest; I remarked at the time that if there had been half a dozen more vesicles like that I should call it shingles and chicken-pox. Some sixty or seventy vesicles have since appeared, and are now becoming covered with typical black scabs. Dr. Galbraith, M.O.H. for Tonbridge, saw this case with me, and agrees with the diagnosis. My patient was greatly indignant at the idea of chicken-pox, and said it was a ridiculous suggestion, so I was glad to be able to show him this week's JOURNAL, where Dr. C. H. Sedgwick relates a case of chicken-pox following herpes.

Strangely enough, he was very interested in "E. K.'s" query on the same page, asking if Dr. W. G. Grace, the cricketer, had "only one lung," for my patient had played for Gloucestershire (he thinks it was in 1877) with "W. G.", and when he read the query in the BRITISH MEDICAL JOURNAL he said, "I never heard Grace had only one lung. All I know is, he could 'roar like a bull.'" This I can corroborate, for when I saw "W. G." playing at Tonbridge against Kent more than thirty years ago, I remembered his voice could easily be heard all over the ground. In my experience people with "one lung" do not, as a rule, have powerful voices, even when their disease is arrested.

DR. A. LYNN HEARD (Bexley, Kent) writes: For long I could not understand the apparently epidemic occurrence of herpes zoster until Dr. Lefeuvre of Knysna, Cape Colony, called my attention some years ago to the connexion between it and varicella. The following cases have absolutely convinced me of the identity of the two diseases:

1. An only child had chicken-pox and was not isolated. Shortly afterwards her grandfather, living in the house, developed slight herpes in the left subclavicular region.
2. A lady and her daughter were for three months at a small Welsh watering place. The child arrived home with a rash. I saw her next day with well marked chicken-pox; no cases were known to have occurred in the watering-place and they had met but few people. Following up Dr. Lefeuvre's theory I asked the mother if she had had a rash and was told she had had a slight one a few weeks previously. Only by insistence did she let me see her back, as she assured me it was nothing. I found the undoubted remains of a mild herpetic rash under the left scapula.
3. An elderly gentleman developed severe herpes on the trunk on December 19th, 1921, as the result of visiting a friend so suffering. A small grandchild, aged 2, was staying in the house at the time. I foretold that in a fortnight it would develop chicken-pox, which duly came to pass on January 1st, 1922.
4. A lady had herpes of the perineum and pudenda and I said her child would have chicken-pox in a fortnight, which was likewise verified.

It is quite evident that the infection is one and the same—appearing usually as varicella in younger and herpes zoster in older subjects—both varieties being infectious. The fact that herpetic cases usually occur singly in households is no doubt generally due to the other members having had chicken-pox in early life.

A DISCLAIMER.

DR. H. L. WARREN WOODROFFE (Chester) writes: In the issue of the *Chester Observer* dated October 13th there appeared a letter entitled "Appreciation of the Infirmary," in which my name was mentioned. I wish to state that the letter was published without my knowledge or sanction.

VACANCIES.

NOTIFICATIONS of offices vacant in universities, medical colleges, and of vacant resident and other appointments at hospitals will be found at pages 34, 35, and 37 of our advertisement columns, and advertisements as to partnerships, assistantships, and locumtenencies at pages 36 and 37.

A short summary of vacant posts notified in the advertisement columns appears in the *Supplement* at page 208.